THE IRON TRADE REVIEW

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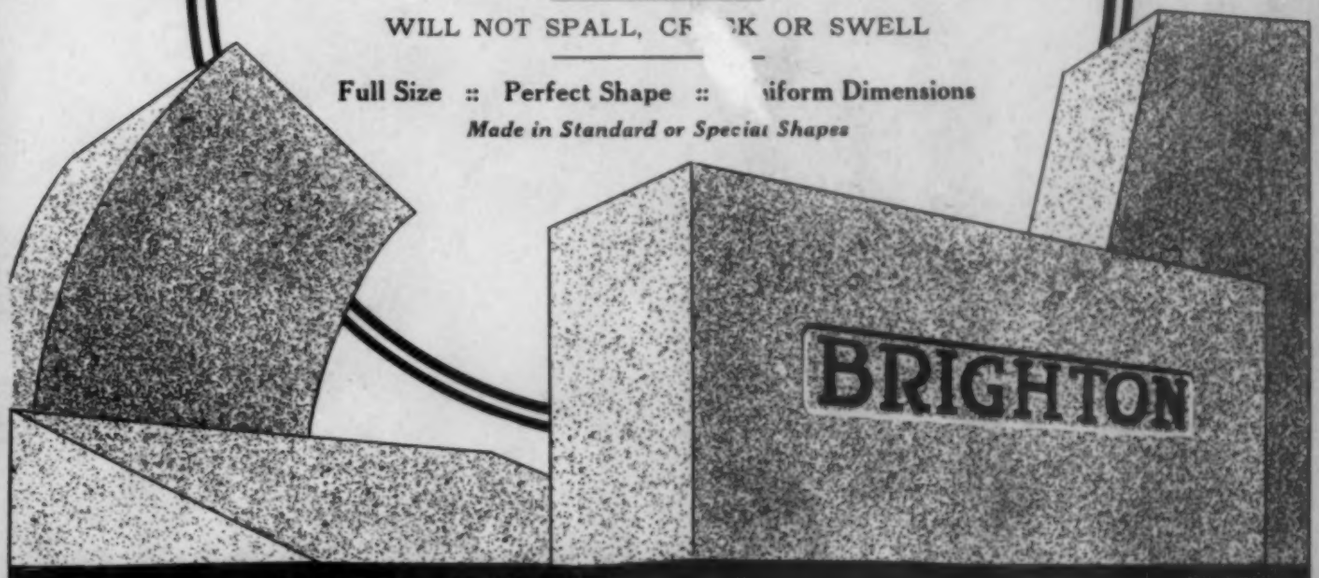

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THE IRON TRADE REVIEW

Vol. LIX Cleveland, October 26, 1916 *No. 17*

Pig Iron Sellers Conservative

High Prices of Coke and Uncertainty as to Ore Responsible for Cautious Selling Policy—Car Buying is Active

SHORTAGE of cars and labor in the Connellsville regions has resulted in extremely high prices for both furnace and foundry grades of coke for prompt delivery. This fact, and the uncertainty as to ore prices have caused leading blast furnace companies to adopt a very conservative policy in regard to sales of pig iron for delivery during the last half of next year. Following the sale of a considerable tonnage for last half in the Buffalo district, at $19, furnace, that quotation was withdrawn and the market in that center immediately became much firmer. In other centers, the price tendency is distinctly upward and some sellers have withdrawn from the market temporarily, awaiting further developments in the coke and iron ore markets. Total sales of the Buffalo furnaces last week are estimated at about 100,000 tons. Sales of bessemer pig iron have been made at $26, valley, the highest price recorded in a number of years. In eastern territory, price advances have been made by leading sellers, while at Chicago, there have been rapid advances.

The Steel Corporation has announced a new advance of $2 in plates, shapes and bars, effective at once. This makes plates 3.10c, shapes 2.80c and bars 2.70c, Pittsburgh.

Iron Ore

Iron ore sellers are still hesitating as to prices for next year, largely on account of the uncertainty as to the carrying rate on ore, which is likely to be advanced 50 cents. Storms last week delayed shipments, but the movement for October will be a record-breaker.

Bars

Another advance of $2 per ton in steel bars has been made by a leading independent company, which is now quoting 2.85c, Pittsburgh, while other leading independents are still quoting 2.70c. Prices, however, are not the principal consideration, as buyers are very anxious to contract and are fearful of not being able to buy at any price unless they get their tonnage on the books of the mills at an early date. Mills are scrutinizing very carefully applications for contracts and are taking business in a very conservative way.

Railroad Buying

In view of the trouble which is being caused by car shortage, it is somewhat encouraging to note the heavy ordering of cars by the railroads which continues in spite of the fact that prices are much higher. It is questionable, however, whether the new cars are being built rapidly enough to prevent an indefinite continuation of the shortage. A Pittsburgh steelmaker recently has booked 100,000 tons of steel for cars. Inquiries are pending for about 10,000 cars and orders booked during the past week totaled about 4,000, bringing the month's total to about 25,000. Inquiry for rails for next year is active and orders for a considerable number of locomotives have been placed.

Shapes and Plates

Atlantic coast ship building yards are planning extensive additions in order to make it possible for them to participate in carrying out the elaborate building program of the navy. It is expected that additions to be made at Newport News alone will require 25,000 tons of structural steel. The demand for plates for ship builders continues active and in some cases higher prices are being named.

Shell Steel

Inquiry for 135,000 to 150,000 tons of shell steel are now pending, following sales of about 30,000 tons last week. Active inquiry for delivery far into the future indicates a belief on the part of the allies that the war will continue for another year at least. The United States government is also buying shell steel freely for delivery through the first seven months of next year. Semi-finished steel of all kinds is scarce, but manufacturers are doing their utmost to meet the requirements of their own government.

THE OPEN HEARTH

Business in Presidential Years

THE presidential campaign now drawing to a close is like that of 1912 in demonstrating that the old tradition that a presidential year is necessarily a period of depression is not well founded.

George H. Hull, in his valuable book on business depressions, published in 1910, discussed this subject at some length and published a table showing that from the foundation of the government down to 1908 very few presidential years have been characterized by depression in business. In fact, the table indicates that during a period of 96 years, presidential elections and industrial depressions have come in the same year only twice—in 1896 and in 1900. Business was profoundly affected in the McKinley-Bryan campaign of '96, on account of the uncertainty as to whether the future basis of the currency would be gold or silver. The depression of 1900 came after the excessively high prices of 1899, and apparently had little, if anything, to do with the presidential election.

In more recent political history, the presidential year 1908 was a very unsatisfactory one from a business standpoint. This fact could not, however, be attributed to the presidential campaign, but rather to the continuing effect of the panic of 1907. The year 1908 marked the end of the price maintenance policy, which had continued for about 13 months to prevent unreasonable competition for the relatively small tonnage of iron and steel products which consumers were willing to buy. There was no expectation, as was pointed out by Judge Gary early in April and again in May, that any price reduction would be made, at least until plenty of time had been taken for deliberation, but when some price cutting developed, prices were promptly dropped to a new level. Destructive competition was prevented and the total decline in the prices of finished steel products during the year did not average more than $3 per gross ton. This was remarkable due to the fact that the demand for iron and steel was reduced by more than 50 per cent as compared with the previous year. Repetition of the disastrous price slashing of previous periods of depression was prevented by the sentiment in favor of co-operation which prevailed after formal efforts had been abandoned. The feeling as the year closed was one of thankfulness that things had not been worse than they were, and the election of Taft furnished reason for hoping that business conditions soon would improve.

Our next presidential year, 1912, was a year of prosperity. Throughout the ante-convention contest, which was one of great bitterness in the Republican party, and throughout the campaign proper, following the nominations, the tide of prosperity steadily rose in spite of the very definite prospect of a change of administration. While issues of great importance to business were discussed, business men were divided to an unprecedented extent among three parties.

The present presidential campaign has lacked much of the bitterness of the fight of 1912, but is like it in the fact that issues of great importance to the business world are being considered. The unprecedented prosperity of the year is not in any way connected with the presidential campaign. The tremendous foreign demand has been the greatest factor and tremendous activity has continued without the slightest influence of political considerations. There is some danger than on account of this great prosperity voters will not give the close attention to pending issues which should be accorded them.

The Business of Safety

IN ITS early stages, the safety movement was a propaganda pure and simple and to put it across the sand bars of industrial inertia determined and prolonged agitation was necessary. Fortunately, at that time the movement was not allowed to die of inanition. Its necessities were appreciated and a group of whole-souled enthusiasts enlisted in the war against industrial carelessness. As a result, it should be frankly admitted, of the unremitting efforts of pledged agitators, the safety-first movement has gained both headway and recognition. It has swept far past the goal set by its original sponsors and ceasing to be a propaganda, has become an industrial fact.

As far as industry is concerned, the work of the safety evangelists is done. The task is now one of organization and methods, requiring for its proper execution the efforts of hard-headed, sane men of business. Scores of such men, converts of the safety evangelists, are now in the thick of safety-first activities. The practical results of their work were plainly evident at the fifth annual safety congress held in Detroit last week under the auspices of the National Safety Council. The proceedings at the Wednesday session of the foundry section and the three sessions of the iron and steel section were remarkable for the extremely definite character of the papers, addresses and discussions. At least as far as the iron, steel and metal trades were concerned, the safety congress was a businesslike gathering of business men assembled to discuss the best methods of carrying out a practical workaday program.

In this connection, the practice of giving special rewards or bonuses to maintain interest in safety

THE OPEN HEARTH

work came in for exhaustive discussion. The consensus of opinion seemed to be that such methods belong to the bygone period of propaganda and that the safety movement has advanced to the point where prizes should no longer be necessary. In fact, the whole tendency at present is to consider safety work as simply an essential part of the daily routine. Safe practices should become reflex and no special mental stimulation should be required to insure their observance.

Will Efficiency Win?

ELIMINATION of scientific shop management from the government arsenal at Watertown, Mass., provided for in the fortifications act of July 6, last, is already showing its detrimental effects. Since the passage of that act, virtually all of the work done at that arsenal is being performed on a strictly day wage basis. While no official reports from the bureau of ordnance, war department, have been made as to the result of a return to the old day rate schedule, it is known it has caused a reduction in productive output and created discontent among the employes. Depriving them, as it does, of bonuses and premiums which they had been enjoying under the Taylor system, they have naturally resented legislation cutting them off from a source of revenue which was a big factor to them in the way of purchasing homes, building up savings accounts and obtaining advantages of other comforts. The fact that the employes have become discontented will, it is believed, be a very important influence in having congress revoke its action and permit the operation of the efficiency system in government plants. It is not forgotten that employes at Frankford arsenal have in the past vainly protested to congress against the elimination of premiums and bonuses at that plant, yet such action on the part of the Watertown arsenal employes, it is maintained, would not only be helpful by way of supplementing the protest from Frankford arsenal, but would be particularly effective for two special reasons. In the first place, beneficial results of the efficiency system to the government and employes alike were more evident at the Watertown arsenal than at any other government plant, because the system was operated more extensively there. This was made possible owing to the character of production at the Watertown arsenal. In the second place, the work there does not lend itself so readily to operating under a piece system as is the case at the Frankford and other arsenals, where that plan is being followed. The legislation in effect, it will be recalled, prohibits scientific shop management at all of the arsenals and navy yards. The postoffice department is the only government institution which has not been affected by this character of legislation, the effort to eliminate it from the postoffice department having failed.

It is probable that plans will be made to extend operations at Watertown arsenal on the basis of piece work, but this promises to be a big problem. It is desirable to do this, however, for the benefit of both the employes and the government. The present is recognized as being an exceptionally important time for economical and efficient production at the government arsenals because of the heavy requirements made upon them in connection with military preparedness.

Organized labor is on record in opposition to the piece work system, as well as scientific shop management, but for some reason not made clear has never urged legislation prohibiting the former in government plants. Supporters of organized labor have made claims on the floors of congress that the anti-efficiency riders were designed in spirit, if not by letter, to prohibit piece work, and have said that Brig. Gen. William Crozier, chief of the bureau of ordnance, violated the law in permitting the operation of the piece work system after the riders were passed. The charge, of course, was unfounded. In order to make sure of his position, Gen. Crozier had asked the controller of the treasury to interpret the legislation, and was informed by the latter that it could not be construed as prohibiting piece work, a system he adopted to take the place as far as possible of scientific shop management, where this plan had been eliminated.

The fact that organized labor's supporters in congress did not attempt at the last session to have included in the anti-efficiency riders a clause specifically prohibiting piece work in government plants has been taken to mean that they are not so sincere as they profess in their opposition to it.

But it is considered doubtful whether employes at Watertown arsenal will be satisfied with employment under a piece work system, even though it is found possible to operate extensively there under that plan. Under scientific shop management, it has been pointed out, employes are guaranteed a minimum wage. Under the piece work system, no such guarantee is given.

The attitude that employes at Watertown arsenal may take toward asking congress to permit them to work under a system of scientific shop management is therefore being watched with unusual interest. Provided they demand that they again be allowed to work under that system, it is conceivable that their efforts will be effectual in the way of bringing congress back to its senses by throwing off the yoke of organized labor domination and permitting efficiency to prevail in government plants.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products October 25, average for September, 1916, average for July, 1916, and average for October, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Oct. 25, 1916.	Aver. for Sept., 1916.	Average for July, 1916.	Aver. for Oct., 1915.
Bessemer pig iron, Pittsburgh	$25.95	$22.20	$21.95	$16.95
Basic pig iron, Pittsburgh	20.95	19.075	18.95	15.95
No. 2 Fdy. pig iron, Pittsburgh	22.45	19.50	19.45	15.57
Northern No. 2, Fdy., Chgo	21.50	18.65	19.00	14.45
Lake Superior Charcoal, Chgo.	20.75	19.75	19.75	16.25
Malleable, Chgo.	21.50	19.15	19.50	15.12
Southern No. 2, Birmingham	16.00	14.38	14.00	11.75
Southern Ohio No. 2, Ironton	20.00	18.25	18.38	14.88
Basic, eastern Pa.	21.50	20.00	19.00	17.50
No. 2X Virginia furnace	19.50	17.50	18.50	14.00
No. 2X foundry, Philadelphia	21.50	19.75	19.75	16.50
Ferro mang., Balti.	164.00	164.00	172.50	105.00
Bessemer billets, Pbgh.	50.00	45.00	40.00	25.50
Bess. sheet bars, Pbgh.	50.00	45.00	40.00	25.50
Op.-h'th sh. bars, Pbgh.	50.00	45.00	40.00	26.50
Open-hearth billets, Pbgh.	50.00	45.00	40.00	26.50
Steel bars, Chgo.	3.10	2.79	2.69	1.59
Steel bars, Pittsburgh, contr.	2.60	2.60	2.50	1.41
Iron bars, Philadelphia	2.659	2.659	2.559	1.559
Iron bars, Cleveland, local del'y.	2.55	2.40	2.40	1.50
Iron bars, Chgo. mill	$2.35	$2.35	$2.35	$1.37
Beams, Chgo.	3.30	2.79	2.69	1.59
Beams, Pittsburgh, contr.	2.70	2.60	2.50	1.41
Beams, Philadelphia	2.959	2.759	2.659	1.609
Tank plates, Pbgh., contract	3.00	2.95	2.86	1.42
Tank plates, Chicago	3.50	3.19	3.09	1.55
Tank plates, Philadelphia	3.909	3.909	3.909	1.609
Sheets, blk., No. 28, Pbgh.	3.40	2.88	2.90	2.05
Sheets, blue an., No. 10, Pbgh.	3.25	2.92	3.00	1.00
Sheets, galv., No. 28, Pbgh.	4.85	4.225	4.37	3.50
Wire nails, Pittsburgh	2.70	2.60	2.50	1.76
Connellsville fur. coke, contr.	3.75	2.48	2.42	2.25
Connellsville fdy. coke, contr.	5.00	3.25	3.15	2.48
Heavy melting steel, Pbgh.	19.00	16.12	16.25	14.00
Heavy melting steel, east'n Pa.	16.00	15.00	15.25	15.00
Heavy melting steel, Chgo.	17.00	15.50	14.15	11.56
No. 1 wrought eastern Pa.	22.00	21.00	19.75	16.00
No. 1 wrought, Chgo.	18.00	16.65	13.95	10.68
Rerolling rails, Chgo.	20.00	16.90	15.70	13.25
Car wheels, Chgo.	12.75	12.00	12.25	11.75

(For Additional Prices See Page 862.)

Buffalo Furnaces Make a Drive

Considerable Tonnage Sold for Delivery Last Half of Next Year—Price Withdrawn—General Trend of Quotations Throughout the Country is Upward

Buffalo, Oct. 24. — Buffalo furnaces have sold in the past week 100,000 tons and over of pig iron, foundry, malleable and basic, for delivery over the remainder of this year, first half and also for last half deliveries of 1917. The heavy selling proved to be a factor in the sharp tightening of prices and after some of the last half of 1917 iron had been quoted at $19 at the furnace, and 25,000 to about 30,000 tons sold at that figure, the price was absolutely withdrawn. The market minimum of the Buffalo furnaces, according to the announcement of all the producing interests today, is now $22 on a basis of No. 2X foundry.

The range of prices, practically regardless of grade differentials, is now $22 to $25. One interest is holding the rest of its unsold product at $25 and there is but a limited tonnage of this available. One interest reports the sale within the past 24 hours of some high silicon iron at $25 a ton while another interest has recently sold a small tonnage of the same grade at $26 at the furnace. This is reported to be the highest price obtained for iron in the Buffalo market since 1907-8.

In the heavy movement of iron for the week, furnaces have turned down thousands of tons that melters sought to have placed. There is an inquiry pending on the part of a large electric interest for 15,000 tons of various grades for its needs over last half of 1917.

The shortage of coke, of labor and of cars presents a situation, which unless it is possible of readjustment, is apt to cause the blowing out of more stacks and bring about, before the end of the year increases in iron prices to possibly $30 or over.

Producing interests say there is no telling what furnaces are apt to be put out of commission by the coke shortage situation; that yard stocks and the margin of production upon which melters have been able to depend are gone, and that large users who feel that they are covered for their needs for current and advance consumption may be cut off short practically without notice. All of the producers of the district have not taken part in the heavy sales of the past week. One furnace interest is selling steadily the entire available capacity of its plant for advance deliveries. Another interest reports, that in view of the serious situation developing, it is oversold and that it is obliged to reject business offered to it.

Sellers Withdraw

Birmingham, Ala., Oct. 24. — The Birmingham situation with reference to pig iron sales is more or less a "hide-and-go-seek" game. Sellers have withdrawn from the market, and some sales agents have gone on vacations, others have been notified by their principals to rest on their oars and bend their efforts toward seeing how little they can induce buyers to take on at this time. This is an actual situation. During the week a customer called one of the sales agents of the district by 'phone and offered him 4,000 tons on the basis of $15.50 per ton at the furnace. The reply was that only 2,000 tons could be accepted. There is no iron being offered in the district at a lower figure than $15.50 per ton at the furnace, with a strong tendency towards $16 by the end of the coming week. One of the large pipe companies placed an order in the district during the week for 60,000 to 70,000 tons for shipment during the first half of 1917. It is understood that $15 to $15.50 per ton at the furnace was the price paid for the iron. Some additional export tonnage was taken on during the week, and several thousand tons of basic iron have been offered porducers at $16 per ton at the furnace. No additional basic contracts have yet been closed, but indications are strong that one or two additional furnaces will be put on basic iron by the first of next year, and that business will be taken on shortly at $16.50 per ton at the furnace for basic. The

(For complete prices see page 862.)

Republic Iron & Steel Co. will have its third furnace repaired and ready for blast by Dec. 1.

Bessemer Sale $26

Cleveland, Oct. 24.—Owing to the great uncertainty as to costs for future delivery, the Cleveland Furnace Co. has temporarily withdrawn from the market and other Cleveland sellers are adopting a very conservative policy. There is a strong sentiment against selling for delivery during the last half of next year and few sales for that delivery have been made by Cleveland companies. Sales by one Cleveland firm made within a few days include 1,600 tons of bessemer for delivery at Erie, 500 of which is for the remainder of this year and 1,100 for the first half of next year, at $25, furnace; 700 tons of bessemer at $26, furnace, for delivery at the rate of one car a week beginning next week; and 600 tons of No. 2 foundry at $22, valley. The American Steel Foundries is in the market for from 5,000 to 10,000 tons of basic for delivery the remainder of this year and the first half of next.

Top Not Reached.

Cincinnati, Oct. 23. — Pig iron prices have advanced again and from all appearances the top of the market has not as yet been reached. The lowest quotation that any furnace in Alabama or Tennessee is making, is $16, Birmingham basis, for southern No. 2 foundry, for any delivery up until July, 1917. No quotations are available beyond that date. The Virginia Iron, Coal & Coke Co. has withdrawn all quotations on its Watts iron, made at Middlesborough, Ky., and is asking from $18.50 to $19, furnace, for Virginia No. 2X. It is the opinion of the market that this price will be advanced in the near future. Practically every furnace in southern Ohio is out of the market. The nominal quotation for No. 2 foundry iron is from $20 to $21, Ironton basis, for the first half of next year. Bessemer iron has been sold in small lots recently around $24, furnace.

Melters are hesitating to close at the present high figures, and as a result inquiries are light. Furnaces have shown no inclination to seek business, some because they are sold up for the first half of next year, and others because they realize that an advantage can be gained for holding sales until further advances in price can be realized. An inquiry for 2,000 tons of malleable iron is out from central Indiana for first half shipment.

Highest in Years

Pittsburgh, Oct. 24.—Bessemer pig iron has sold at $26, valley, the highest price recorded in more than a decade. From a reliable source, it is learned that 1,000 tons of standard bessemer iron were sold at that figure, which leads to the belief that this grade no longer is obtainable at $24, the previously prevailing price. A Cincinnati foundry, which will make ingot molds, continues to negotiate for about 12,000 tons of bessemer iron. The American Iron & Steel Mfg. Co., Lebanon, Pa., is negotiating for 15,000 tons of basic iron for shipment the remainder of this year. An inquiry came out a few days ago for about 18,000 tons of bessemer iron for export. Several lots of No. 2 foundry iron have been sold at $22, valley, this week. The price of basic iron is unchanged at $20, valley. No. 4 furnace of the Shenango Furnace Co., Sharpsville, Pa., has been blown out for relining.

Decided Upward Trend

Philadelphia, Oct. 24.—A continuation of erratic prices for pig iron, all showing a sharp upward trend, reflects the unsettling effects under which the market still is laboring as the result of soaring coke costs. Actual market prices for iron in this territory are difficult to determine, and it is manifest that the spread is a considerable one. Irregular banking of some eastern Pennsylvania furnaces because of coke shortages remains a very disturbing factor. A number of additional sales of eastern Pennsylvania No. 2X have been made at $22, furnace, some of them in this immediate district, or at $22.79, delivered. There also have been sales at $22.50, furnace; one fair-sized lot taken by a consumer closeby was done at $23, furnace. Additional furnaces adopted the $22 price the past week for any delivery. Some eastern Pennsylvania makers quote $21 for this year and certain central Pennsylvania producers have been asking $19.50 to $20, furnace, or about $21.20 to $21.70, Philadelphia. The Philadelphia market may be quoted today at $21.50 to $22 for No. 2X. Virginia prices again have been advanced 50 cents to $18.50, furnace, for No. 2X, or $21.25, Philadelphia, and there have been liberal sales at this figure, so that a third rise in that district now is awaited.

Virginia sales have been heavy recently and the leading maker there is reported to have booked 50,000 tons since Oct. 1 and has only a limited amount now to offer. Small sales of Alabama No. 2 for last half were made here this week at $16.50, Birmingham, and makers booked liberal lots of Lake Superior charcoal at $23.50 to $24, Buffalo, representing an advance of about $2.50 within a week. Foundry and charcoal sales generally have been small, but numerous. The Bethlehem Steel Co. placed with Virginia makers 1,800 tons of foundry for Sparrows Point. The Pennsylvania railroad inquiry for 1,500 to 3,000 tons of foundry and charcoal is reported closed. The Standard Cast Iron Pipe & Foundry Co. has made some purchases against a recent inquiry for 5,000 to 6,000 tons. Pipe makers here paid as high as $15.50, Birmingham for No. 3. Eastern Pennsylvania rolling mills bought several thousand tons of standard forge at $19, furnace, or about $19.75, delivered.

In steel-making grades the American Iron & Steel Mfg. Co., Lebanon, Pa., has inquired for 15,000 tons of basic for six months. Low phosphorus basic also is asked. Eastern basic is untested and nominally from $21.50 to $22, delivered. Further sales of standard low phosphorus iron have been made at $40, Philadelphia, equivalent or $37.38 to $38, furnace, and two carloads went at $42, eastern Pennsylvania furnace, or $42.30, delivered. Lebanon low phosphorus is quoted at $35, furnace. The Bethlehem Steel Co. has withdrawn its recent inquiry for 15,000 to 20,000 tons of high silicon bessemer and will make this iron itself. A Philadelphia user bought 600 tons of malleable around $24, delivered.

Prices Still Advancing

New York, Oct. 24.—Prices on iron have moved forward considerably in this territory during the past week. The movement has been a general one, but at the same time it has been irregular and the prices on the business closed have shown a greater spread than usual. Eastern Pennsylvania No. 2X has been sold in this territory as high as $23.25, delivered, for the first half, one lot of 500 tons having been done. On the contrary, 1,000 tons of No. 1X for first quarter was placed at $21.50, delivered at a Jersey point. Buffalo iron has been sold at $21, furnace, for No. 2X. Leading Virginia makers today made the third advance in about two weeks, moving up the first-half schedule $1 to $19.50, for No. 2X and last half, 50 cents to $19. Central Pennsylvania iron has been quoted from $20 to $21, furnace. A large Alabama producer is reported to be asking $17 for No. 2. The week's volume of business has been considerable, but much of it was done without formal inquiry. Buffalo makers have been closing up a number of contracts with regular customers for various deliveries next year, some of them for last half, and this is esti-

(*For complete prices see page* 862.)

mated to have called for from 10,000 to 15,000 tons. A Paterson, N. J., machinery builder bought 1,000 tons of eastern Pennsylvania No. 1X for first quarter at $21.50, delivered, and 1,000 tons of No. 2 plain from Virginia at slightly less. Another New Jersey consumer placed 1,000 tons. Export inquiry is very heavy, totaling perhaps 75,000 to 100,000 tons at present, but sales have been lighter the past week. This latter condition is attributed to the sharp rise in prices which has caused buyers to hesitate.

Holland continues to be a prominent purchaser. One New York export house at this time has out inquiries for 25,000 tons of bessemer, 12,000 tons of low phosphorus and several thousand tons of other grades for Italy, Switzerland and France. Another New York exporter wants 10,000 tons of special bessemer for Italy, delivery by March. It is interesting to note that foreign buyers now will entertain prices for first quarter of next year and beyond whereas up to this time they have been inclined to deal only with early iron. Bessemer and low phosphorus grades are scarce. On Alabama iron for export, $16, Birmingham, is obtainable.

Runaway Market at Chicago

Chicago, Oct. 24.—A runaway market seems to have started in Chicago pig iron, and the same symptoms are evident in quotations on other grades which are sold in this market. The seller, for the first time in many months, or even years, seems to have all the best of it, and about the only option left to the melter is to take or leave the iron offered him.

The first evidence of a change in conditions came late last week when 50 cents per ton was added to quotations on foundry and malleable, bringing them to $20, furnace. Since then, the increase has been at the rate of almost 50 cents per day per ton, and sales have been made at $21.50, furnace, while $22, furnace, is being asked at this time. The situation is such that advances beyond this figure are expected, and no one is able to predict where the end will be.

Northern iron of southern analysis has been sold at $21, Chicago, which is equal to $17, Birmingham, and indicates that competition at a lower price is not being furnished by southern furnaces. Many furnaces are sold up and have dropped out of the market, while others are worried over their supply of coke. A shortage of freight cars is a factor limiting the sale of this iron.

Virginia iron has been advanced $1, making the schedule $20 for No. 1, soft, and $19 for No. 3. The Red River furnace, which has been shading Jackson County prices on silvery iron, has advanced its schedule to the Jackson County basis. Much inquiry is still being entertained by Chicago furnaces for bessemer iron for export, and a number of fairly large tonnages are being negotiated. Pig iron makers prefer to give domestic buyers first opportunity to protect themselves, and are holding off as much as possible on export iron. Inquiries are being received frequently for iron to move to distant markets, indicating the sold-up conditions at those centers.

Sale of Southern Basic

St. Louis, Oct. 23.—While the inquiry for pig iron before this market is confined to small tonnages this week, sales last week have given rise to the belief that a buying movement may be near, if, indeed, it has not started. One of the largest sales made last week was 10,000 tons of southern basic for delivery to a local steel plant. Sales amounting to 1,500 tons of various grades of pig, including a tonnage of lake Superior charcoal iron also were reported, and altogether the market seems to be in good condition. Southern pig iron is quoted at $15.50 to $16, Birmingham, for delivery over the rest of the year, and at $16 to $16.50 for first half of next year. Northern iron is held at $19 to $19.50, Chicago, and $19.50 to $20, f. o. b., Ironton.

New Shell

Invented at Toronto Made of Cast Iron is Tested

Toronto, Oct. 24.—A new high-explosive shell has been invented by J. C. McLachlan, a Toronto electrician, which, it is claimed has been proved by official tests made at Quebec to be more effective than the British regulation shell of the same class, while it can be produced at half the cost. The new shell is made from cast-iron instead of steel and formed under a chilling process. In shape and size it is almost a replica of the British shell and is fitted with the British cap, but the band grooves are cast instead of being machined. When tested at Quebec, it was fired under a pressure of 14½ tons to the square inch and broke into a thousand pieces, the largest being less than 2 inches square. The British shell does not burst with the same force nor into as many fragments.

Owing to the great demand for aluminum for munition making and its consequent increase in price, the Ontario hydro-electric commission has substituted copper for aluminum wiring on its transmission lines.

(*For complete prices see page* 862.)

Iron Ore Prices

Depend Very Largely on Rate for Carrying for Next Year.

Cleveland, Oct. 24. — The price of iron ore for next year depends very largely on the carrying rate, which this season has been 50 cents net from the head of the lakes on contract ore, while $1 has been freely paid on wild tonnage. It seems assured that if the $1 rate for carrying is established for next year, the price of ore will be advanced at least $1, and some ore men are advocating an advance of $1.25. With higher royalties, higher costs for all supplies and probable advance in labor, ore men think that it will be necessary for them to obtain more than $1 advance, if there is a 50-cent advance on the carrying rate. For example, it is pointed out that steam shovels are selling at from 25 to 33 1-3 per cent more this year than last year, while dynamite and powder are very much higher. Royalties on sliding scale contracts are also an important factor.

The storm which raged over Lake Erie last Thursday and Friday resulted in the loss of four vessels and 54 lives. The property loss was estimated at about $325,000. The movement of all vessels on Lake Erie was of course somewhat delayed, but not enough to curtail to any great extent the immense tonnage which is being shipped.

Willing to Pay $1 Advance

Philadelphia, Oct. 24.—Eastern blast furnace interests have manifested their willingness to pay $5.45 at lower lake ports for some tonnage of old range non-bessemer ore for this year's delivery, or an advance of $1 a ton over the current season's schedule. It is very doubtful, however, whether sellers will be able to offer any additional ore for the delivery desired by reason of their inability to get it down the lakes before navigation closes. It is understood that some African bessemer ore has been quoted at 10½ cents, per unit, at tidewater, with any change in freight to the account of the buyer. The uncertainty over deliveries and freights, makes transatlantic ore not attractive to buyers at present, and, in fact, there are very few sellers who now can offer such mineral. Eastern ore interests are keeping away from doing any contracting for next year, pending the determination of lake ore prices.

The Reading Iron Co. on Oct. 4 advanced its wages for puddling from $7 to $7.50 a ton, the highest rate ever paid in eastern territory.

Sheet Market is Calmer

Rush of Buying Subsides, But Situation is Strong and Famine is Feared in Pittsburgh District

Youngstown, O., Oct. 24.—Sheet buying this week has been less active than during the previous week. In fact, as one sales manager expresses it, last week's active buying movement could not keep up. The falling off in demand has not been accompanied by any weakness in price and there is every indication that prices are firmer.

Last week's buying was the natural result of the attempts of consumers to insure their sheet supplies for the first quarter of 1917. The announcements of the American Sheet & Tin Plate Co. a few days earlier in which that company's prices for the first three months of next year were made public, resulted in bringing out a flood of inquiries. The flood fairly swept the sales offices off their feet for a few days.

Sheet producers in most cases have covered their old customers and are now hesitant about booking additional tonnages for next year. This hesitancy is the result of the belief that steel prices have not attained their maximum and, in the case of some mills, from the uncertainty about first quarter costs. Mills desiring business could undoubtedly book the full capacity of their mills through the first quarter without delay.

Black sheets are quotable at 3.40c, the leading interest's figure, but some independents are having little trouble in securing 3.50c, and for prompt delivery as high as 3.75c.

Galvanized sheets also are in demand and high prices are being obtained by the few mills which can promise delivery during the next two months. One mill this week booked an export order at 5.25c, the highest price brought out in this district. For the domestic trade 5c is quoted and sales have been made at that figure.

Blue annealed sheets are stronger. This grade has been comparatively quiet for some weeks, but has strengthened during the past few days. The market is firm at 3.25c. The new mills which the Trumbull Steel Co. has just completed will begin operations tomorrow.

The car situation continues serious and great difficulty is being experienced in securing sufficient equipment to handle outgoing shipments.

Scarce at Pittsburgh

Pittsburgh, Oct. 24.—With several of the larger manufacturers of steel sheets virtually out of the market, having found it more profitable to divert their steel to other channels of the trade, some people in close touch with the situation express the opinion that an actual famine of steel sheets will exist the first six months of next year. Sheet mill departments in two plants have been operating only in part for many months and galvanizing pots in many plants have been idle for a year or longer. Some mills able to furnish special sheets for the manufacture of automobiles and electrical equipment, are not figuring in the general trade at all. The demands of the automobile and electrical equipment trades are heavier than at any previous time in the history of the industry. Furthermore, activity has been augmented considerably by foreign consumers, who are negotiating for very heavy tonnages for prompt and future delivery. Mills are asking 3.40c and above for black sheets. Galvanized sheets are selling at a wide range in price. One consumer paid 4.85c for 500 tons of coated stock a few days ago. As generally expected, blue annealed sheets are being offered at wide ranges in price, owing to the fact that mills are not following the same classification in quoting the several gages.

Advance in the East

Philadelphia, Oct. 23.—Leading eastern Pennsylvania makers of sheets have advanced their prices to a minimum of 3.25c, Pittsburgh, or 3.409c, Philadelphia, for No. 10 gage blue annealed and are making sales at this figure. Previously they were doing 3c in some cases. There is talk now of 3.50c. The demand is quite active, both domestic and export. Foreign inquiries, usually calling for only moderate lots, are coming out freely. Japan and Australia have been buyers of eastern makers. Independents in the east are expected to adopt the new price differentials on sheets put out by the leading maker.

Much Higher at Chicago

Chicago, Oct. 24.—Decidedly higher prices are being quoted on steel sheets, No. 28 gage black being current at 3.69c, Chicago, and No. 10 gage blue annealed at 3.59c to 3.69c, Chicago. Galvanized are selling as high as 4.69c, Chicago, without question, and some tonnages for closer delivery have commanded better prices.

Tabor Enlarges Plant.—The Tabor Ice Cream Co., Cleveland, was recently recapitalized with a capital stock of $2,000,000. At a recent meeting, J. B. Crouse was elected president; F. H. Tabor, vice president; H. A. Tremaine, treasurer and C. E. Kennedy, secretary. With the addition of new capital, the company will be able to make new and extensive improvements, including a new factory and an ice plant, with machinery and equipment for both. The buildings will be made of reinforced concrete.

(For complete prices see page 862.)

Moves Machinery to Canada

The American Ammunition Co., New York, which has been operating two floors of the four-story factory of the R. B. Phillips Mfg. Co., in Worcester, Mass., under lease, making parts of fuses for the allies the past year, has closed its part of the plant, purchased some of the machinery and removed it to St. Catherines, Ont., where the parts will continue to be made in its branch factory. The company employed between 300 and 400 men in Worcester, working on a 24-hour day basis, nearly all of whom have found work elsewhere. Though the lease did not expire until Jan. 1, the Phillips company accepted it as of Nov. 1, and will use the two floors for its own business, being booked up six months ahead with orders. The future of the Phillips company in Worcester, will be determined Feb. 1, 1917, and should it decide not to continue, arrangements will probably be made to keep the business in Worcester. The plant was formerly operated by the Critchley Machine Screw Co., and comprises two separate factories in different parts of the city.

Says Conduct Was Lawless

In the case of the American Steel Co., Pittsburgh, against the American Steel & Wire Co., of New Jersey, and other defendants to recover $750,000 damages under the Sherman anti-trust act, pending in the United States district court, Boston, Judge James M. Morton has overruled the demurrer to the first count, which alleges an attempted monopoly, and sustained the demurrer to the second count charging a combination in restraint of trade. Judge Morton said the conduct of the defendant company was "lawless and indefensible". He said that the company secured control of 75 per cent of the entire output of coated wire nails in the United States and then determined to create such difficulties of competition as to force out of business all with whom the company was unable to come to terms.

Coke Prices Climb High

Runaway Market in Both Furnace and Foundry Grades—Car and Labor Shortage Continues

Pittsburgh, Oct. 24.—The market for Connellsville coke has advanced to abnormally high levels and it looks as if the trade situation had got beyond the control of cokemakers. How long the runaway market will continue is difficult to say. Blast furnace fuel for immediate shipment has sold at as high as $7.50 a ton and foundry coke has commanded the same price. Blast furnace managers, however, are beginning to complain about prices and it is likely that many furnaces will slow down until more nearly normal prices prevail for coke. The Bethlehem Steel Co. and the Republic Iron & Steel Co., both of which get their fuel from by-product ovens, have figured in the Connellsville market to a considerable extent this month. The scarcity of cars and the shortage of labor have combined to send prices of coke to the highest levels to prevail since the anthracite coal strike some years ago. *The Connellsville Courier,* for the week ending Oct. 14, says production was 404,806 tons, compared with 416,126 tons the week before.

Still Banking Furnaces

Philadelphia, Oct. 25.—Prompt Connellsville coke sold in the east during the past week at $6.50, at the ovens, and prompt foundry coke at $7, ovens. Reports also reached the east a day or two ago from Pittsburgh that $7 has been paid on at least one lot of prompt furnace coke. One of the sales made at $6.50 called for more than 1,000 tons, and 10 cars were offered here a day or two ago at the same price. Some of the sellers of Connellsville foundry coke now are asking $7.50. There has been considerable buying of Virginia furnace coke and sales of the past few days of from 10,000 to 12,000 tons monthly for first half of next year, are noted. For Virginia furnace coke, $3.40, ovens, has been paid, and $3.60 is reported. Virginia coal has been bringing $3.50 per ton, and there is talk now of $4. Several of the eastern furnaces continue to be embarrassed by shortages of coke and although the situation has improved through spot buying, some banking of stacks still is being done. At New York, there is an export inquiry for 20,000 tons of furnace coke.

Advancing at Cincinnati

Cincinnati, Oct. 24.—The southern coke market could almost be said to be running away. Prices are uncertain, and are advancing rapidly. A few quotations were made today on spot foundry coke as high as $7, ovens. Wise County and Pocahontas foundry coke for contract delivery are quoted from $4.25 to $4.75, ovens, but it is almost a certainty that these prices will be much higher before the end of the week. Pocahontas and New River furnace coke are quoted from $3.75 to $4.25, ovens, with an advance also in sight before the end of the week. New River coke is quoted from 50c to $1 a ton above that from Wise County and Pocahontas fields. Demand is light, but ovens are advancing prices upon the general strength of the market.

Very Few Sales

Cleveland, Oct. 24.—Owing to the very high prices prevailing for foundry coke, very few sales are being made in the Cleveland district. Deliveries are slow, but the Cleveland foundries have been able to obtain enough coke to continue operations without embarrassment.

Warehouse Stocks

Are Not Easily Replenished—Some Unusual Shipments

Pittsburgh, Oct. 24.—Warehouses at this center are having just about as much difficulty obtaining material as consumers of finished products who buy direct from mills. They have been unable to replenish stocks in many instances and cannot accept orders for large tonnages of single sizes. It is interesting to note that some of the smaller fabricating interests have been depending upon the warehouses recently for about 50 per cent of their material. This naturally makes it increasingly difficult for these fabricators to figure in the market, on account of the high prices of structural material and the uncertainty of the future. Steel plates are being offered by warehouses at a range from 3.75c to 4c. The Carnegie company has made no change in its prices since the adoption of the 3.75c figure, but 4c is being quoted by several interests. Steel bars under 2-inches in diameter, and structural shapes are offered at 3.25c. Hoops are quoted at 4c and bands at 3.40c.

Store Demand Heavy

Chicago, Oct. 24.—Demand on warehouses for materials to fill in gaps left by the inability of mills to make prompt shipments is making it difficult to keep assortments in anything like completeness. It has not yet come to an acute situation and mill deliveries have been kept up close to contract requirements.

Prices are unchanged except in the case of black sheets, No. 28 gage being quoted now at 3.90c, Chicago store, having ascended like a rocket in the past few days. It is expected that blue annealed will follow shortly, as they appear too low in proportion.

Plate Prices Advanced

New York, Oct. 24.—Prices from store on narrow plates have been advanced $5 per ton, to 4.25c, delivered, in the metropolitan district. Wide plates remain unchanged at 4.50c; shapes and steel bars at 3.35c. Warehouse business continues very active and is limited only by the extent to which the jobbers are able to get material from the mills and keep up their stocks. Some unusually large orders for steel from stock now are being placed, as a number of buyers, in view of the congested condition of the mills, have been forced to depend upon the warehouses to piece out their requirements on work under way.

Hard to Replenish

Cleveland, Oct. 24.—Warehouses are having great difficulty in replenishing their stocks. In some cases, shipments are made from Chicago to this district, and some sales are being made in Cleveland for shipment to Pittsburgh. No changes in prices have yet been announced, but there is a likelihood of sheet quotations being marked up at an early date.

Demand for Structurals

Cincinnati, Oct. 24.—Demand for light structurals is good and warehouses report that in several instances they have been unable to secure sufficient material to cover specifications. Prices are unchanged. Cold rolled shafting is quoted at 10, plus the list price. Iron and steel bars are quoted from 3.35c to 3.90c, and shapes at 3.35c, and plates at 3.75c, all f. o. b. Cincinnati. Warehouses are not making a specialty of selling sheets, as that material is being handled directly by rolling mills in this vicinity.

The General Briquetting Co., 25 Broad street, New York City, has closed a contract to install in the works of the National Conduit & Cable Co., Hastings-on-Hudson, one of its hydraulic presses for the briquetting of brass chips. A similar press recently was installed in the plant of the Chase Metal Works, Waterville, Conn. France has placed an order for two additional presses, following an initial shipment made to that country several months ago.

(*For complete prices see page* 862.)

Plate Prices Show Range

But Market is Very Strong and Clamor for Deliveries Continues—Heavy Inquiry for Export

Philadelphia, Oct. 23.—Depending on quality and use, plate prices continue to cover a rather wide spread, and these tend to emphasize the point of greatest strength and demand, which is ship yard steel. Ship plates to Lloyds specifications are commanding readily from 4c to 4.50c, Pittsburgh; ordinary tank plates are selling from 3.50c to 3.75c, Pittsburgh, and universals from 3.25c to 3.50c, Pittsburgh, with eastern mills. On narrow tank plates, eastern makers have encountered competition of 3.35c, Pittsburgh, outside this district. Some mills which were slower to sell in the past now are more aggressive for tank steel orders. The irregularity of the market between grades robs it of little of its strength, which continues very great since the fresh demand is heavy and the mills are so far sold ahead that some of them are obliged to reject business. One large independent booked in the week 6,000 to 10,000 tons additional of new business, mostly from the ship yards. A 1,700-ton order for construction work at Cleveland went to a local maker. A jobber placed 600 tons. Among the new inquiries is one for 3,000 to 6,000 tons of ship plates for third quarter, the deliveries on which will run into 1918.

The export inquiry remains large. There is a new Pacific coast request for 3,000 tons for Japan. Other Japanese inquiries, some of them extra large, are reported. Great Britain has large inquiries current. The government takes bids Nov. 2 on 500 tons for the Panama canal. Platemakers and ship builders are much interested in the opening of bids by the government for a large part of the extensive naval program, which takes place Wednesday.

Held at Higher Prices

Pittsburgh, Oct. 24.—Several manufacturers of steel plates now are asking 3.25c and 3.50c for delivery at their convenience, or from $5 to $10 a ton above the price quoted by the Carnegie Steel Co. For prompt delivery, one mill is offering material at 4c and it frequently is predicted that plates for future shipment will sell at that figure before the end of this year. Car and ship building interests are taking very heavy tonnages and some of them are buying for delivery the latter part of 1917. With few exceptions, mill managers cannot make deliveries until the second quarter of next year.

Plate Market Wild

Chicago, Oct. 24.—No limit to the price plate consumers are willing to pay has appeared yet. An important producer recently received an inquiry asking the approximate total tonnage of plates it could deliver during last half of 1917 at 4c, Pittsburgh. The apparent offer for its output at this premium was not entertained.

It is believed plates will be advanced $2 per ton to 3.29c, Chicago mill, during the present week. Unusual demand for car-building material and continuance of ship-building activity present the bulk of demand for this material.

Stronger Than Ever

Cleveland, Oct. 24.—The plate market is stronger than ever. One company which has been quoting 3.50c, Pittsburgh, on plates and No. 10 sheets is now quoting 3.75c to 4c on plates in some cases, the delivery being for from four to six weeks. The advancing of quotations has not checked buying and further advances are very probable.

Cast Iron Pipe

American Foundries Lose in Competition With England.

New York, Oct. 24.—Another advance in cast iron pipe in view of the higher costs due to rising pig iron prices, is imminent, but eastern foundries have not yet taken action. There is a heavier buying movement in pipe, which is due chiefly to the purchases now being made for spring delivery by the water, gas and other private companies. Some large lots have been placed. The Brooklyn Union Gas Co. has been buying but the Consolidated Gas Co. has not yet come into the market. Municipal inquiries are few, the only new one to appear being from Newark, N. J., for 2,100 tons of 6-inch to 36-inch to close Nov. 2. It is learned that American foundries which bid for this business have lost to English competitors the large tonnage of pipe which has been in the market for Buenos Aires, Argentine. Advantages in freight rates and the fact that English specifications were used resulted in the success of the English shops.

Detroit Contract Closed

Detroit, Oct. 24.—It is now officially reported that the cast iron pipe contract recently let by the city of Detroit to the American Car & Foundry Co., involves a total of 40,430 tons. The specifications call for 4,250 lengths of 48-inch pipe, 1,563 lengths of 42-inch and 167 lengths of 36-inch, with an aggregate weight of 30,430 tons, together with 10,000 tons of miscellaneous sizes ranging from 6 to 24 inches. The contract also provides for a 25 per cent increase in the tonnage at the option of the city. A blanket price of $30.50 per gross ton f. o. b. Detroit is named in the contract. This figure is considered reasonable in view of the prevailing market conditions. Two other bids, submitted by the United States Cast Iron Pipe & Foundry Co., Burlington, N. J., and R. D. Wood & Co., Philadelphia, were received in addition to the proposal of the American Car & Foundry Co. The United States Cast Iron Pipe & Foundry Co. bid $30.80 f. o. b. Detroit, and R. D. Wood & Co., $32.20. The contract provides for the delivery of 4,000 tons per month commencing in 30 days.

Few Substantial Orders

Birmingham, Ala., Oct. 24.—The manufacturers of cast iron pipe in the Birmingham district report the booking of several substantial orders during the week, but that on the whole prospects have narrowed down to actual necessities on the part of municipalities being supplied, which are comparatively small. This is due, as they explain, to the season of the year when outdoor work on the part of cities is confined to natural upkeep. Business of considerable volume is not expected until spring, at which time manufacturers believe that pipe will be several dollars higher per ton than at present.

Pipe Line Plans

Call for Large Tonnage of Pipe—Oklahoma Line.

Pittsburgh, Oct. 24.—Recent advances in the price of crude petroleum have tended to stimulate considerably demand for oil country goods. If makers of line pipe, drive pipe, tubing and casing could meet specifications for delivery before April 1 next, it is likely that several important pipe line projects would be undertaken. The City Service Co., controled by Henry L. Doherty & Co., New York City, which recently acquired some of the larger oil producing interests in the southwest, is considering plans for building a line from the Oklahoma field to St. Louis, a distance of about 450 miles. A 6-inch and 8-inch line of that length would require about 35,000 tons of pipe. Demand for locomotive and merchant boiler tubes continues very heavy and premium prices are being paid in many instances.

(For complete prices see page 862.)

Bar Prices Are Higher

Cambria Steel Co. Advances $2—Specifications Heavy —Few Contracts Are Being Made

Philadelphia, Oct. 23.—A further advance of $2 a ton in steel bars to 2.85c, Pittsburgh, has been put into effect by the Cambria Steel Co., which has been quoting 2.75c, Pittsburgh. Other leading independents continue to name 2.70c, Pittsburgh, which for some of them is a nominal figure since they are indifferent to new business and are doing very little selling. The 2.60c price has not entirely disappeared, however. The effect of the advances made by independent bar makers has been to stimulate specifications against old contracts and these are active. It is significant that some leading buyers, including a prominent railroad system, already has specified in full its contract for the first half of next year. The Pennsylvania railroad now has out an inquiry for 1,500 to 2,000 tons of bars for last quarter. Not many new bar contracts now are being made, and the producers prefer to quote only on specific business. Small sales chiefly are moving.

Active at Pittsburgh

Pittsburgh, Oct. 24.—The scarcity of railroad cars has further complicated the general situation for semi-finished and finished steel products. Manufacturers say the car situation has been becoming more acute and many consumers have been rather seriously embarrassed, on account of deferred deliveries. Specifications for steel bars are coming out in heavy volume and some new buying is enjoyed. Mills are asking from 2.60c to 2.70c for delivery at their convenience; for prompt delivery, one mill is offering steel bars at 2.75c. Iron bars continue to be held at from 2.65c to 2.75c, mill.

Substituting Iron

Buffalo, Oct. 24.—In order to secure deliveries, some users are substituting iron bars for steel. Practically the only business taken by the mills is with contract customers of long standing and with no delivery dates specified. Inquiries are appearing in the market for last half of 1917 and into first quarter of 1918, but mills are not disposed to contract so far ahead even upon specific contracts binding upon buyers as well as upon the mills.

Steel Famine is Seen

Chicago, Oct. 24.—Buying of steel bars and other forms of finished steel continues at an unabated rate, regardless of price and remoteness of probable delivery. Already the leading interest is booked to probably the end of third quarter of next year and the demand is not checked in the least.

One steel mill is taking new business at a rate about 50 per cent in excess of its shipments, in spite of the fact the latter are at the highest level in months. At the same time business equivalent to 60 per cent of its output is being turned down.

An advance of at least $1 per ton on soft steel bars is expected to be made this week.

Very Close Scrutiny

Cleveland, Oct. 24.—Leading steel companies are proceeding with extreme caution in making contracts for shapes, plates and bars. All applications for contracts are scrutinized very carefully. The recent lull in specifying by automobile manufacturers did not continue long and furnished very little relief to the mills.

Bar Iron Strong

Chicago, Oct. 24.—Demand for bar iron continues good and sales are being made into next year at prevailing prices. Little iron remains unsold for delivery over the remainder of this year and most new business now being taken is for first half. While it is not certain that 2.35c, Chicago mill, has disappeared as the minimum quotation, it is increasingly difficult to place business under 2.40c to 2.50c, Chicago, for first half. It seems probable that 2.40c is practically the minimum at present and indications are that this will disappear in a short time if demands continue and booking are made at the present rate.

Hoops and Bands

Pittsburgh, Oct. 24.—The Carnegie Steel Co. has made no change in its prices of hoops and bands since the adoption of the 3c figure of hoops and the 2.60c price of bands. The company, however, virtually is out of the market for shipment before the second quarter of next year. Consumers say material is not available for early delivery.

Shafting Active

Pittsburgh, Oct. 24.—The market for cold rolled steel shafting is still quoted at a range from 10 to 20 per cent off the list. Some mills are refusing to sell for delivery after Dec. 31, although others have freely offered tonnage for delivery the first quarter of 1917. Specifications against contracts are heavy and new buying is active.

(For complete prices see page 862.)

Tin Plate Buyers

Are Being Allotted Tonnages in a Very Conservative Way.

Pittsburgh, Oct. 24.—Tin plate consumers are endeavoring to obtain additional tonnages of material for shipment the first six months of next year. As previously explained in these columns, mill managers are allotting tonnages for distribution the first and second quarter of 1917. It is apparent that many can makers will be seriously embarrassed, on account of inability to cover requirements. No formal change in prices has been made, but the market gradually is being established at $6, base. It is likely that some tonnage for delivery next year will command much more than $6, base.

Generally Quoting $6

Cleveland, Oct. 25.—On a very large order for tin plate a contract has been made at $5.75 base box by an independent company, but on all ordinary business the $6 quotation is being rigidly adhered to and allotments are being made in a very conservative way, as it is evident that the supply will hardly be equal to the demand.

Wire Wanted

In Large Tonnages for Shipment to France and England

Pittsburgh, Oct. 24. — The Morgan interests recently sent out inquiries for heavy tonnages of galvanized and painted wire for shipment to France and England. It is not known for what purpose the material will be used. Heavy demand exists for barbed wire for shipment abroad. Advanced prices, announced Oct. 19, by the American Steel & Wire Co., have been adopted by independent makers. These prices are $2 a ton above those previously prevailing, as was explained in the Oct. 19 issue of *The Iron Trade Review*. Some mills, it is understood, permitted consumers to cover needs for a 60-day period, before advancing quotations. Specifications from jobbers, whose stocks generally are described as low, are heavy. Mills have not been able to accumulate much surplus tonnage for a year or longer.

Scrap Market is Strong

Large Tonnage of Turnings and Borings Purchased for Blast Furnace Use in the East—Advances in Nearly All Centers

Philadelphia, Oct. 23.—From 20,000 to 25,000 tons of turnings and borings, it is estimated, have been purchased for blast furnace use by a leading eastern Pennsylvania steelmaker and this buying has been the most important transaction of the scrap market in this district. The prices paid were $10.50, delivered, for the borings, $8.75, delivered, for the turnings, and $9.25, delivered, for mixed turnings and borings. The brokers continue to be the principal buyers of heavy melting steel, but the demand in the east for Pittsburgh shipment, has dropped away. The embargo at Coatesville recently lifted has been reimposed. Brokers are offering $16, delivered there, for steel when the embargo is lifted. For other points $15.50, delivered, is offered. The rise in rerolling rails continues and $20.50, delivered, now is offered by buyers. Railroad wrought is higher and heavy cast has advanced in line with the buoyant pig iron market.

Strong at Cleveland

Cleveland, Oct. 24.—Iron and steel scrap here is strong, with advances being registered in foundry grades as well as those which have been long in good demand for steel mills. In fact, all grades used in foundries have gone up due to a big demand from users who were glad to substitute them for pig iron which has gone up in the last two or three weeks. Included among them are steel rails under 3 feet in length, railroad malleable iron, No. 1 machine cast and stove plate.

A purchase of 20,000 to 30,000 tons of heavy melting steel of railroad grade or its equivalent has just been concluded by the Brier Hill Steel Co., Youngstown, O., at prices ranging from $19 to $19.50 a gross ton, delivered. A sale of iron rails has been made in the local market at $35 to $36 a gross ton. No. 1 railroad wrought and busheling have taken on gains due to purchases. Light scrap still is not wanted by the mills which can use it because they prefer the heavy material that allows larger and quicker production. Old steel rails over 6 feet in length are now being bought up for straightening and rerolling into bars.

Scrap Still Climbs

Chicago, Oct. 24.—Higher quotations continue to come out for iron and steel scrap in this market. Steady demand is felt for most lines and the supply is none too large to meet necessities. Brokers for the most part are inclined to hold their material for better prices and this is responsible for much of the strength. Present prices on many grades of scrap are close to a record and even higher levels are expected to be reached.

Railroad offerings are small, the lists now being considered being as follows: Chicago & Eastern Illinois railroad, 860 tons; Rock Island railroad, 3,150 tons; Chicago, Burlington & Quincy railroad, 2,100 tons.

Scrap Iron Advancing

Cincinnati, Oct. 24.—A general advance is reported in the iron and steel scrap market. Steel scrap especially is strong as a good demand has continued throughout the past two weeks from rolling mills in all parts of this territory. The only weak spot in the market is cast borings, which, dealers state, are barely moving. This is surprising, as that material should be in good demand at present. The quotation on heavy melting scrap is $15 to $15.50, per gross ton. Cast borings are quoted from $4.75 to $5.25, per net ton.

Trend Still Upward

St. Louis, Oct. 23.—Scrap prices continue to follow the upward turn, the advance applying to all principal grades except turnings and borings, which are unusually weak owing to light consumption in this market. Heavy melting steel is exceptionally strong, and sales have been made at $19 a gross ton. Railroad offerings are unusually light, due to the scarcity of labor and shortage of equipment. Consumers lately have been drawing heavily on their reserve stocks and they shortly will have to come into the market for heavy tonnages. This condition, together with the scarcity of railroad scrap and the activity of the pig iron market, is having a tendency to further advance scrap iron prices. The only railroad offering before the market is a small list issued by the Chicago & Eastern Illinois amounting to 880 tons.

Still Gaining

Birmingham, Ala., Oct. 24.—The scrap iron market continues to gain strength, and certain grades are becoming more scarce each week. In fact, contracts in hand for steel scrap of all kind will take care of every ton of steel scrap that can be assembled for some time to come. Dealers are traveling the entire southern states adjacent to Birmingham to corral the material. With a further advance in the pig iron market, dealers expect a sharp advance in scrap prices.

Still Stronger

Pittsburgh, Oct. 24.—Sellers of old material in this district have not lost their courage, because of price declines registered in adjacent districts. Most dealers are asking maximum quotations, at which figures considerable tonnage has been sold. Heavy melting steel has commanded $19 a ton, although the $18.50 price has not entirely disappeared. Low phosphorus steel scrap has sold at as high as $23, delivered, and other grades are correspondingly high in price. The leading interest has not been figuring in the market recently, but many of the independent concerns have purchased heavy tonnages this month. Despite heavy shipments, no railroad embargoes exist against the delivery of scrap in this district.

Heavy Buffalo Sales

Buffalo, Oct. 24.—Sales of heavy melting steel have been made in considerable volume during the week at above market prices. A considerable portion of the dealing reported was between dealers in their efforts to cover short orders. Yards look for an early advance in price of this line.

Additional strength is shown in low phosphorus billets and bloom ends now being quoted at $22 to $22.50. The entire scrap list shows increasing strength. There are a number of inquiries before the market involving good sized tonnages of the different lines.

Dealers report that the labor shortage situation makes it difficult for them to put material in proper shape on their yards.

Buying More Freely

New York, Oct. 24.—Local consumers of most grades of scrap other than heavy melting steel are buying more freely and the market is both more active and stronger. Heavy melting steel, as far as eastern works go, still is the exception, as the latter are doing practically nothing. The inquiry for steel from Pittsburgh brokers to cover orders recently taken in that district, continues to appear and the prices being paid are up to $15.50, New York. For shafting, $22, delivered eastern Pennsylvania, is offered. Car wheels are higher and a sale of 1,000 tons at over $16, delivered eastern Pennsylvania, is noted. Borings and turnings are firmer as the result of the recent heavy buying of the Bethlehem Steel Co. Low phosphorus is scarce and very strong at from $21.50 to $23.50, delivered.

(For complete prices see page 862.)

Shapes for Ship Yards

Proposed Extensions Will Require Large Tonnages—Policy of Government in Regard to Naval Program is Important Factor

New York, Oct. 24.—Eastern ship builders have in view some unusually large extensions of plant capacity and the scale of the execution of these will be dependent upon the manner in which contracts for the large naval program of the government are awarded under bids to be taken tomorrow and later. It is understood that these enlargements provisionally contemplated for Newport News alone will call for about 25,000 tons of structural steel. Other eastern yards have large extensions in view. The railroads continue to come into the market liberally for structural steel needs. As a forerunner of the large construction programs which they have in view, much of which yet is to be offered, a number of the eastern railroads have been materially increasing their engineering and draftsmen forces. They are having considerable trouble to recruit their engineering staffs to the desired size. General structural work in New York City has dropped off and new inquiries of the past few weeks are light. Plain shapes are strong at from 2.70c to 2.85c, Pittsburgh, or from 2.869c to 3.019c, New York.

Some Large Orders

Philadelphia, Oct. 23.—Some attractive tonnages of shapes now are being booked by eastern producers at the price of 2.85c, Pittsburgh, for which they are holding firmly. A leading jobber bought 1,500 tons and a car builder 1,100 tons from two different mills the past week at this price. These lots are for forward delivery. The latter by next May. There were smaller sales also at 2.85c, Pittsburgh, and carloads have been bringing 3c, Pittsburgh. While structural jobs of size are not numerous, a good tonnage of miscellaneous needs constantly is reaching the market and certain mills report that current orders of this kind represent about one-third of their incoming tonnage at present, the latter consisting of specifications against contracts. Active obligations, with some mills at least, continue to increase over shipments. A few customers have been covered on first quarter contracts by eastern makers and more seek this accommodation. One large independent has been quoting 2.70c, Pittsburgh, for first quarter contracts. The Eastern Steel Co. will furnish 3,000 to 4,000 tons of plain material to Levering & Gerrigues for the fabrication of the Philadelphia Electric Co.'s power station at Chester.

Shapes Active at Pittsburgh

Pittsburgh, Oct. 24.—Demand for structural material continues very heavy. Fabricating shops are operating at maximum capacity and most of them have enough actual tonnage on hand to maintain present operating rates well into the second quarter of next year. Structural shapes are quoted at 2.70c for delivery at the convenience of the mill and at 2.85c for prompt delivery.

Structural Lots Small

Chicago, Oct. 24.—Strong demand exists for steel shapes for various uses, although lots are small and heaviest tonnages are going to consumers fabricating them into other than structural material. No project involving more than 500 tons was closed in the west during the past week and most were for much less. An advance of $1 per ton to 2.94c, Chicago mill, is expected to be made this week.

CONTRACTS AWARDED.

Bridge work for the New York & Long Branch railroad over the Manasquan river, 1,000 tons, to the McClintic-Marshall Co.

Bridge work for the Delaware & Hudson railroad, 400 tons, to the Phoenix Bridge Co.

Car repair shops at Spencer, N. C., for the Southern railway, 500 tons, to the Virginia Bridge & Iron Works.

Loft building for the Nameloc Co., 43-51 West Thirty-sixth street, New York, 1,100 tons, to the Hinkle Iron Works.

Apartment, Ninety-second street and West End avenue, New York City, 600 tons, to the Hinkle Iron Works.

Pier, Weehawken, N. J., 300 tons, to the Phoenix Bridge Co.

Cathedral, Newark, N. J., 400 tons, to the Hay Foundry & Iron Works.

CONTRACTS PENDING.

Extensions to the plant of the Joseph Dixon Crucible Co., Jersey City, N. J., 1,200 tons, bids being taken.

Bridge over the Kennebec river for the Maine Central railroad, 2,000 tons, bids being taken.

Bridge work for the Boston & Maine railroad at Montpelier, Vt., bids being taken.

Building for the Packard Motor Car Co., Philadelphia, 200 to 300 tons, bids being taken.

Four bridges for the Pennsylvania railroad, 2,000 to 2,500 tons, bids being taken.

Power house at Cromby, Pa., for the Philadelphia Suburban Gas & Electric Co., 250 tons, bids being taken.

Crocker Bros. Expand.—Crocker Bros., pig iron and alloys brokers, have more than doubled the capacity of their Cincinnati office, located at 1520-22 First National Bank building. This move was found necessary because of the increasing business being done by the Cincinnati office, which embraces in its territory all of the central states. Another salesman has also been added to the sales force of the Cincinnati office. Herbert F. Topp is western representative of the company.

(*For complete prices see page 862.*)

Billet Scarcity

Is Pronounced—Slabs Also Are Hard to Find.

Philadelphia, Oct. 23.—Nothing has developed from preliminary requests for shell steel for delivery after July 1 which some of the eastern makers have been receiving. It is not understood that these inquiries are more than overtures to feel out the situation for later purchases. Leading purchasing representatives of the European belligerents are not making any specific inquiries as yet. The tension in semi-finished steel remains as severe as ever and it is practically impossible to find any considerable tonnage of billets or slabs for delivery before many months. Except for small lots, eastern makers are not offering material and some of them have found that they have been selling more of their output than they should. A Schuylkill valley plate mill wants 500 to 600 tons of slabs and the government a small lot of soft steel billets for the Panama canal. Prices among eastern mills are held at $50 to $55, mill, on rerolling billets, and $65 to $70, mill, on forging billets. Some sellers have been obliged to accept under $35, mill, for shell bloom discards.

Will Place Heavy Tonnage

New York, Oct. 24.—Preliminary negotiations are being opened by the belligerent powers for shell steel to be delivered over the last half of 1917, but these have not progressed far enough to warrant the placing of any contracts. Some options are reported to have been taken. The tonnage of munition steel to be placed for the last six months of next year, is expected to be considerably heavier than that recently ordered for the first half ending July 1, according to producers. The latter base this statement upon the fact that extensions now under way will materially increase the steel capacity in service by the last half of next year, which will enable the producers to offer a greater quantity. It is believed that all of this augmented tonnage will be readily absorbed since it has been the case with the recent shell steel buying that

the amount of the tonnage has been limited only by the capacity of the makers. The mills are talking of 4.50c, mill, for shell blooms, billets and bars for the last six months of 1917, which would compare with 3c to 3.25c for the bulk of the tonnage closed for the first half.

A New Factor

Cleveland, Oct. 25.—A manufacturer of nickel steel, chrome nickel and other special analysis steels has appeared in the Cleveland market as an important factor in selling forging billets of ordinary analysis, the price for the latter being made lower than the ordinary quotation on condition that an order for special steel be placed at the same time. Owing to the scarcity of semi-finished material, it is not difficult to make an arrangement of this kind.

Insistent Inquiries

Youngstown, O., Oct. 24.—Urgent inquiries for semi-finished steel continue to reach steel producers here. The sold-up condition of the mills prevents serious consideration of these inquiries. One buyer who was trying to buy 2,000 tons of sheet bars for prompt delivery, told local mills that he had scoured every steel mill in the country without success. Shell steel inquiries for good-sized tonnages are beginning to appear in this district. Discards from shell steel stock are stronger, commanding $26 to $30 for first crops and up to $35 for the second crops, the latter being sounder steel.

Higher at Pittsburgh

Pittsburgh, Oct. 24.—One of the leading sellers of semi-finished steel products has advanced its minimum price to $50, mill, for billets and sheet bars for delivery the remainder of this year. Several contracts for sheet bars have been written at that price and doubt is expressed whether it would be possible to shade that figure. The shortage of railroad cars has contributed to complicate the general situation. Consumers say a scarcity of semi-finished steel products now exists. Wire rods are being held at a range from $55 to $60 a ton, although no formal prices are being quoted by leading makers. Muck bar is held at $45, Pittsburgh.

Active Buying of Cars

Is Being Continued, Unchecked by High Prices and Extended Deliveries—Rail Inquiry is Spreading

New York, Oct. 24.—Heavy buying of cars by the railroads goes on steadily and the high prices and extended deliveries which the buyers now must accept, apparently, are having little or no deterrent effect. As the result of this heavy buying movement of equipment, steel prices to the car builders are being advanced $2 a ton. It is understood that 3.10c on plates, 2.80c on shapes and 3.20c, on axles, went into effect this week. A large Pittsburgh steel maker recently has taken about 100,000 tons of new car business. The past week has seen the largest influx of new inquiries that yet has marked the present brisk movement. Requests for prices on about 10,000 new cars came out and it is to be noted that some of the most prominent systems have been included among those inquiring. Among the new inquiries of the week, were 1,500 box and 1,000 automobile for the Union Pacific; 1,000 hoppers and 1,000 box for the Baltimore & Ohio; 500 to 2,000 hoppers for the Philadelphia & Reading; 1,000 box for the New York Central; 1,000 stock for the Missouri, Kansas & Texas, and 500 stock for the Chicago & North-Western. The Atlantic Coast line is reported to be in the market for 1,000 cars and the Pere Marquette continues to negotiate for 1,000 to 1,500 box cars.

New orders closed this week totaled about 4,000, bringing the month's total to date to from 20,000 to 25,000, including those cars ordered to be built in railroad shops. The Chicago & North-Western bought 1,500 box of the American Car & Foundry Co. and 1,000 gondolas of the Pullman Co. The Chesapeake & Ohio closed for 500 additional hopper cars each with the Pressed Steel Car Co. and the Ralston Steel Car Co., making its recent purchases, a total of 3,000. The American Car & Foundry Co. will furnish 1,000 tank cars of the recent Union Tank Line order. The Mount Vernon Car Mfg. Co. has taken 750 gondola underframes from the Louisville & Nashville and 250 center constructions for the Gadsden Car Works. The Pressed Steel Car Co. received 20 mine cars from the Sterling Salt Co. and six sleepers from the Illinois Central.

Reports again are current that action is about to be taken on the large Russian car order. These are to the effect that 7,000 cars will be closed. It is believed that the activity of the domestic roads is responsible in bringing this matter to a head.

Inquiry for 1918 rails is spreading among the railroads. Some of the systems with headquarters in this city now have come into the market for round tonnages for that period. Some roads which have inquired for additional lots of rails for early delivery have been quoted on the third quarter of 1917 and have been glad to accept these positions. One lot of 6,000 tons and another of 2,500 tons for that period were closed. Eastern mills report some additional orders from France and Italy. New Zealand has revived a formal inquiry for 10,000 to 12,000 tons. The Hocking Valley has bought its rails for 1918, but is in the market for 3,000 tons for this year.

In locomotive buying, the American Locomotive Co. has taken 100 of a small type for the British war office, six larger locomotives for Spain and one for Saumatra. This is in addition to 50 for the Paris Orleans railway and 20 for the Finland State railway; previously reported.

Standard spike buying has been more active. The Seaboard Air line has bought 5,000 to 8,000 kegs, the Virginian, 4,000 to 5,000 kegs and the Erie 2,000 to 3,000 kegs. The Baltimore & Ohio negotiations for 10,000 to 20,000 kegs, still are open. The New York Municipal railways is out for 750 kegs. Leading makers of spikes now will do 2.65c, Pittsburgh, only for early shipment and want more for contracts.

(For complete prices see page 862.)

Locomotives Ordered

New York, Oct. 25. (By wire.)—The Buffalo, Rochester & Pittsburgh has placed 15 locomotives with the American Locomotive Co. and the Western Maryland 10 additional with the Lima Locomotive Corporation.

Large Car Inquiry Out

Chicago, Oct. 24.—Railroads continue to inquire for and buy rolling stock, though deliveries on present purchases cannot be made before third quarter of 1917 at best. The Chicago & North-Western railroad has bought 1,500 wooden box cars, containing little steel, from the American Car & Foundry Co., and 1,000 gondolas from the Pullman Co. This is about the extent of the new business placed in the west.

Inquiries are current as follows: Illinois Central, two lots of gondolas, 1,000 and 1,200; Chesapeake & Ohio, 2,000 hoppers; Baltimore & Ohio, 1,000 hoppers and 1,000 box cars; Chicago & North-Western, 500 stock cars; New York Central, 2,000 box cars; Pere Marquette, 1,000 box cars.

Paris Railroad Order

The Paris railroad of France has ordered 50 Mikado locomotives of the American Locomotive Co. This brings total orders received by the company since Oct. 1 to 8,217 locomotives.

Reopens Case

And Will Have Hearings in Western Cities

Washington, Oct. 24.—The Interstate commerce commission has entered an order reopening the entire transcontinental rate case for further hearings. Involved in the case are rates on iron and steel products from the east to the Pacific coast and intermediate points. The schedule covering iron and steel was reopened the past summer as a result of a petition for this purpose, which was prepared by the Merchants' Association of Spokane, Wash. It was contended by them, and other intermediate interests, that slides in the Panama canal and the diversion of ships passing through that waterway to other trade had made it unnecessary for the railroads to longer maintain unusual rates to the coast, which, it was held, discriminated against inter-mountain territory consumers. The commission upheld this contention, and ordered the rail carriers to readjust their rates, to become effective on Sept. 1. The new tariffs wiped out differentials on iron and steel articles from Chicago, Pittsburgh and Atlantic seaboard territory to the Pacific coast and named a blanket rate of 94 cents per 100 pounds, increasing the Chicago rate from 55 cents, the Pittsburgh rate from 65 cents, and the New York rate from 75 cents.

Protests were made against these advanced rates, and a hearing held with regard to them in August, and in consequence the tariffs were suspended. The new order consolidated all of the rates affected in the intermountain case, and hearings relating to it will be held before Examiner-Attorney Thurtell, on the dates and at the places which follow:

Nov. 20, Chicago; Nov. 28, Salt Lake City, Utah; Dec. 4, San Francisco; Dec. 11, Portland, Ore., and Dec. 14, Spokane, Wash.

Discussed New Contract

The new contract form recommended by the National Association of Sheet and Tin Plate Manufacturers was discussed at the meeting of the Metal branch of the National Hardware Association at the convention of that society last week at Atlantic City. W. S. Horner, president of the National Association of Sheet and Tin Plate Manufacturers, explained the new contract, which was discussed further by a number of manufacturers and jobbers. W. H. Donlevy, Carter, Donlevy & Co., Philadelphia, who is chairman of the Metal branch of the Hardware Association, will appoint a committee to confer with members of the National Association of Sheet and Tin Plate Manufacturers at an early date. While no important changes will be made in the contract, it is likely that one or two minor features will be added or eliminated. The sheet and tin plate manufacturers will hold a meeting Nov. 9.

New Bethlehem Rolling Mill

The contract given to the Morgan Construction Co., Worcester, Mass., to equip two billet mills for the Bethlehem Steel Co.'s new works in Sparrows Point, Md., will be fulfilled at other plants in the United States as far as the manufacture of machinery is concerned, on account of the company being taxed to its utmost capacity with other orders. The mills will be similar to those built by the company several years ago for the Gary, Ind., works of the United States Steel Corporation. The 24-inch mill will have a capacity of 100,000 tons per month and the 18-inch mill a capacity of 50,000 tons a month. Deliveries are to be made within 18 months. Most of the work will be done in Ohio, Pennsylvania and Maryland.

Merger of Wire Plants Progressing

The merger of wire manufacturing plants in Worcester, Spencer and Clinton, Mass., is progressing in New York in a manner said to be satisfactory to the promoters and announcement of its completion may be expected this week. The combine will include the Spencer Wire Co., with plants in Worcester and Spencer, the Morgan Spring Co., operating two plants in Worcester and the Clinton Wire Cloth Co., operating a plant in Clinton. The Wright Wire Co., Worcester, will not go into the combine because of the high price placed upon it by its president and general manager, Mayor George M. Wright, Worcester. Headquarters of the new company, which will be a Massachusetts corporation capitalized at about $10,000,000, will be in Worcester. Harry W. Goddard, president and treasurer of the Spencer Wire Co., is slated to be its president, and Evan F. Jones, treasurer and general manager of the Morgan Spring Co., is said to be in line for the general management. New York bankers are promoting the deal.

Malleable Plant

Will be Built at Kalamazoo With Up-to-Date Equipment.

A malleable plant, to be equipped with two melting furnaces with a capacity of 30 tons per heat, is being built at Kalamazoo, Mich., by the Kalamazoo Malleable Iron Co. The building will be 220 x 265 feet and a covered crane runway for conveying raw materials from the yard to the furnace will be provided, which will be 80 feet long and 34 feet wide. The coal grinding plant will be 39 x 106 feet. A 5-ton electric traveling crane will command the entire length of the foundry, extending throughout the length of the crane room or loading shed. The furnace charges will be made up in this loading shed in bottom dump steel charging boxes 7 feet long, 22 inches wide and 20 inches deep. The annealing furnaces will be operated with powdered coal as fuel. The coal grinding machinery will be installed by the Raymond Bros. Impact Pulverizer Co., Chicago, and the coal dryer equipment will be furnished by the C. O. Bartlett & Snow Co., Cleveland. The cleaning room equipment, including a sand-blast, will be furnished by the Whiting Foundry Equipment Co., Harvey, Ill. A 5-ton hand-operated crane will command the annealing room and the annealing boxes will be charged and discharged from the furnaces by a steam-operated charging machine. The plant is being erected under the supervision of D. J. Albertson and D. C. Gerow, engineers and architects of Kalamazoo.

Ohio Blower Co.'s New Plant

The Ohio Blower Co., 5125 Perkins avenue, Cleveland, has purchased a strip of land on Detroit avenue near W. Ninety-third street, which will be improved by a four-story building, 60 x 120 feet. The company has been forced to take new quarters, the old plant being entirely too small to handle the business. The new building will be of mill construction and the owners hope to occupy it by the first day of March. The Ohio Blower Co. manufactures roof ventilators, general sheet metal, etc.

Walter H. Knight, president of the Bridgeport Projectile Co., and of the Bridgeport Forge & Projectile Co., with plants in East Bridgeport, Conn., has filed a petition in bankruptcy showing liabilities of $93,000 and assets of $1,699.30. The schedule discloses ownership of only one share of stock in each corporation of the par value of $10 each.

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

GEORGE A. CRAGIN, who until Dec. 6, 1915, was assistant general sales agent of the American Steel & Wire Co. under General Sales Agent Frank Baackes, Chicago, and for seven years in charge of the Worcester, Mass., territory, where he lives, has been appointed general sales manager of the wire department of the National India Rubber Co., Bristol, R. I. Mr. Cragin was connected with the American Steel & Wire Co., and its predecessors for 35 years and is one of the best known wire men in the country.

J. T. Johnson has resigned as superintendent of the shell department of the Driggs-Seabury Ordnance Co., Sharon, Pa.

J. W. Rider, secretary-treasurer of the Colorado Fuel & Iron Co., has been elected a director. The retiring directors and officers were reelected.

Willard S. Morse, of the American Smelting & Refining Co., is on his way to South America where he will inspect the company's various properties.

R. E. Lewis, general superintendent of the Lehigh plant of the Bethlehem Steel Co., has been elected a director of the company.

Frank R. Rhodes of Eaton Rhodes & Co., pig iron brokers, Cincinnati, has left for a pleasure trip to Honolulu, Philippine islands. Mr. Rhodes will return to this country about Dec. 10.

Henry K. Swinscoe, formerly superintendent of the Morgan Spring Co., Worcester, Mass., is now connected with the Reed-Prentice Co., in the same city.

Charles S. Kinnison, formerly western advertising manager for *The Blast Furnace and Steel Plant*, has been appointed general sales manager for the Flota Mica Sales Co., with offices at 1201-2-3 Kresge building, Detroit.

Wm. H. Hunter, who has been the salesman in New England for the Republic Iron & Steel Co., has been placed in charge of a new Boston office opened by the company in the John Hancock building. Mr. Hunter will have the title of Boston representative.

R. S. Fox is in charge of an office recently opened by the Reliance Iron & Coke Co., Cincinnati, at 1742 the Frick Annex, Pittsburgh. Mr. Fox has been identified with the Reliance company about three years and previously was connected with Walter-Wallingford & Co., Cincinnati at Pittsburgh and Chicago.

Owing to continued ill-health, Sir George Paish of London, the noted financial expert, has resigned as a member of the Canadian railway board of inquiry. W. M. Ackworble, of London, who has had much experience in railway matters and has acted on several commissions on railway questions in England, is named as his successor.

O. W. Mason, formerly manager of sales of the Fownes Bros. interests at Pittsburgh, has resigned to become affiliated with Hickman, Williams & Co., Cincinnati, as eastern manager and will have charge of their business in the territory east of Johnstown, Pa. W. L. Hoffman will continue to act as manager of the company's office at Philadelphia.

Carl E. Akeley, sculptor and naturalist, and John Van Nostrand Door, president of the Door Cyanide Machinery Co., have been awarded the John Scott legacy medals and premium by the city of Philadelphia. The award to Mr. Akeley was in recognition of his invention of the cement gun and to Mr. Door for his development of hydro-metallurgical equipment in the cyanide industry.

The F. Raniville Co., Grand Rapids, Mich., manufacturer of leather belting, has opened a New York branch at 6 Church street to afford better facilities for taking care of its rapidly-developing eastern and export trade. Geo. S. Baker, formerly secretary of the Olmsted-Flint Co., has been placed at the head of the New York selling organization. Complete stocks of the goods manufactured by the company will be carried.

W. R. Hughes has resigned as sales manager of the Victor Auto Parts Co., Cincinnati, and is now secretary, treasurer and manager of sales of the Corcoran Mfg. Co., Cincinnati. The Corcoran Mfg. Co. has no connection with the Corcoran-Victor Co., nor is John L. Corcoran, who was president of the Victor Auto Parts Co., nor Edwin B. Corcoran, who was treasurer of the Victor Lamp Co., connected with any concern other than the Corcoran Mfg. Co.

J. M. Nelson, formerly with the Algoma Steel Co., Sault Ste. Marie, Ont., has been appointed superintendent of the open hearth department No. 2 Saucon plant of the Bethlehem Steel Co., succeeding W. H. Bischoff, who recently resigned to take up the superintendency of coke ovens, blast furnaces and open hearth furnaces of the Dominion Iron & Steel Co., Sydney, N. S. O. F. Luckenbach, formerly connected with the Oil Well Supply Co., Oil City, Pa., has been appointed superintendent of the drop forge department of the Lehigh plant of the Bethlehem Steel Co., succeeding Wm. Hunziker, resigned.

J. A. Neilson, general foreman of the small tool department of the Billings & Spencer Co., Hartford, Conn., will resign Nov. 1 because of ill health.

Clarence Matthews, superintendent of the Camden Iron Works, Camden, N. J., is recovering in a Camden hospital from painful injuries sustained in a recent automobile accident.

Herbert Lucas, New York, and Miss Marcia Mead, New York, designer of the Ellen Wilson homes in Washington, have been selected as architects by the Bridgeport Housing Co., Bridgeport, Conn., in the construction work of its buildings.

William Priestly, a former Chicopee, Mass., newsboy, who is now at the head of the machine department of the Bethlehem Steel Co., South Bethlehem, Pa., has been dispatched to Europe and will travel in England and France in the interests of the company.

Albert C. Schultz, assistant engineer of the Locomobile Co., Bridgeport, Conn., has resigned after 14 years' service to become chief engineer for the Mercer Car Co., Trenton, N. J. His associates presented him a gold watch with his initials set in platinum.

Alfred Craven, at present chief engineer of the Public Service Commission of New York City, has been appointed consulting engineer of the commission, effective Nov. 1. Mr. Craven has been in charge of the extensive rapid transit improvements in the metropolis which now are approaching completion. Daniel L. Turner, deputy engineer of subway construction, has been named as acting chief engineer.

The Strong Steel Foundry Co., Buffalo, N. Y., soon will begin the erection of an addition, 80 x 125 feet, to its foundry. Contracts for an electric crane and a furnace have been let.

Judge Gary's Speech

Will Be Important Feature of Meeting at St. Louis

At the meeting of the American Iron and Steel Institute, to be held at the Planters hotel, St. Louis, Friday and Saturday of this week, the presidential address of Judge Gary will be a feature of special interest, as it is expected to deal with world-wide conditions in a comprehensive manner. It will be delivered Friday morning, at the opening of the first session. The remainder of the morning session and also all of the afternoon session will be occupied by the reading and discussing of the following papers:

The president's address, Elbert H. Gary.
St. Louis and Its Industries, Clarence H. Howard, president, Business Men's League, St. Louis, Mo.
The Duplex Process, George B. Waterhouse, metallographist, Lackawanna Steel Co., Buffalo.
Pulverized Coal as a Fuel for Metallurgical Furnaces, James W. Fuller, president, Fuller Engineering Co., Allentown, Pa.
The Iron Ores of the Adirondack Region, Frank S. Witherbee, president, Witherbee, Sherman & Co., New York.
Progress in Hot Blast Stove Design, Arthur J. Boynton superintendent, blast furnaces, the National Tube Co., Lorain, O.

A buffet luncheon will be served members of the Institute during the recess between the morning and afternoon sessions. The banquet will be held Friday evening in the beautiful and commodious banquet room of the new Missouri Athletic Association, Fourth and Washington streets, three blocks from the Planters hotel.

On Saturday the members of the institute are to be taken on a special train around the St. Louis terminals and to see a few of the city's leading industries. The party will stop at the plant of the Commonwealth Steel Co.'s plant for luncheon, after which the special train will circle around to the west end of the city, where automobiles will await the visitors to take them on a pleasant ride through the residence district and suburbs of St. Louis.

Ferro Prices

Show More Firmness—Ferro-Silicon Quotations Advanced

New York, Oct. 24.—Ferro-manganese prices again show a little more firmness, as considerable of the lower-priced and resale metal recently offered has been absorbed. Some of the domestic producers now are holding more uniformly for $165, delivered. There are some quotations still being made below this figure, however, as the periodical offerings of steel works producers remain an uncertain factor in the domestic trade. As previously noted, from $160 to $162, delivered, recently has been done and it is not clear at present whether all such quotations have disappeared. English producers are doing very little new selling, but their price is unchanged at $164, seaboard. There continue to be some sales of 73 per cent Indian metal at $2, per unit, and it is understood that most of these lots recently brought in or now afloat have been taken up. Current business in ferro-manganese is not heavy and is confined to miscellaneous lots, usually small. Shipments of this alloy from England are more liberal and it is expected this condition will continue in view of the higher-priced contracts which now are being entered upon.

From 500 to 1,000 tons of spiegeleisen are in the market, this including both domestic and foreign inquiries. This alloy is quoted at from $40 to $45, furnace, but for 20 per cent metal about $43 is wanted. There are still reports of considerable irregularity in prices in 50 per cent ferro-silicon for early delivery. Makers ask $100, on carloads for forward shipment.

Lower Grades Advance $2

Pittsburgh, Oct. 24.—All manufacturers of lower grades of bessemer, ferro-silicon have advanced prices $2 a ton to $33, furnace, for No. 10 per cent. Some tonnage already has been sold at the new prices and it is not unlikely that further advances will be made at an early date. Most sellers have virtually withdrawn from the market for delivery the first quarter of next year. The situation for 80 per cent ferro-manganese is unchanged, with dealers asking from $162 to $166 for prompt and future delivery. Fifty per cent ferro-silicon is held at $100, Pittsburgh.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, Oct. 24.—Steadiness characterized the metal markets this week, prices on every description, remaining very firm. Owing to a big improvement in the demand for prime western during the last few days, quotations in this market are advancing rapidly. Although inquiries for spelter are numerous and good-sized tonnages are being placed, the volume of metal actually booked, however, is not so large as it might be, owing to the backwardness of producers who are displaying much confidence in the future of the market. Demand for the most part is from domestic consumers, the galvanizers being among the most active buyers. Prime western now is being quoted as follows: Prompt and October, 10.25c St. Louis; November and December, 10c to 10.12½c, and first quarter, 9.75c to 9.87½c. Some buying of brass special also is in evidence, but the tonnage involved is relatively small. Producers of this grade of spelter are quoting approximately 11c, St. Louis, for prompt shipment.

The copper market is very strong with good tonnages being booked from day to day. Most of the business is being placed by domestic buyers, although some foreign demand also is noted. The present situation, however, is rather quiet as compared with the recent heavy buying. Nearby metal remains very scarce and the market is completely in the hands of the producers, as has been the case for sometime. Quotations on electrolytic are practically unchanged from last week, holding in terms of cash as follows: Prompt and October, 28.50c to 29c; November, 28c to 28.50c; December, 27.87½c to 28.12½c; and first half, 26.75c to 27.25c. Prime lake quotations in terms of cash follow: Prompt, October and November, 28c; December, 27.75c. Prices on casting copper are: Prompt and October, 27c to 27.25c; November, 26.75c to 27c, all in terms of cash.

Activity in lead is of somewhat larger proportions, although the market still is relatively quiet. Within the last couple of days a better interest is being shown by domestic consumers for future positions. One large outside producer reports a number of inquiries for material for December shipment, and states that several tonnages have been placed for delivery in that month at around 6.90c, St. Louis. Inquiries from abroad also are in evidence but only in fair volume. The outside market may be quoted today at 7c to 7.12½c, New York, and 6.85c to 6.95c, St. Louis. The American Smelting & Refining Co. continues to quote 7c, New York, and 6.92½c, St. Louis, for prompt shipment.

The tin market is firm and slightly more active than last week. Dealers report some fair buying for nearby positions, but very little business is being done in futures. Straits tin for spot shipment may be quoted today at around 41c, New York.

Outside sellers of aluminum report a fairly active demand for No. 1 virgin ingots by domestic buyers, and also state that some small buying is being done for shipment to Europe. The metal continues very scarce and sellers still are keeping their prices up. The outside market for spot shipment is as follows: No. 1 virgin in carload lots, 64c to 66c, New York; No. 1 remelted, 60c to 62c; and No. 12 alloy, 47c to 49c. The demand for these latter two grades continues comparatively quiet.

Demand in the antimony market is rather dull, but owing to shortage of nearby material prices are very firm. Russia and Italy both have inquiries in the market at this time and some other foreign consumers are asking for antimony although tonnage involved is understood not to be large. Wah Chang's W. C. C. brand is holding at 13c to 14c, duty paid, New York. Domestic brands are quoted at approximately the same level.

(For complete prices see page 862.)

Mesta Develops New Gear Planer

Pittsburgh Company Designs New Machine for Cutting Herringbone Gears and Pinions—The Gear Blank is Held Rigid While Tool Goes Through Three Different Motions to Properly Cut Tooth

THE advantages which properly cut herringbone gears offer over cut spur gears and even over cut staggered spur gears have been causing a constantly increasing demand for this type of gear since its introduction. However, one of the inherent requirements for such gears is that the cutting be accurately done. While correct cutting can be very readily accomplished by the hobbing process, this method is unfortunately limited to gears of small pitch. For rolling mill work fine toothed gears are not desirable, because the slight inaccuracies in alignment, unavoidable in mill practice, have a much more detrimental effect on their operation and life than on gears of coarse pitch.

The best method to cut gears with large pitch is by a planing operation. Heretofore with herringbone gear planers, the helical motion has always been obtained by rotating the gear blank while the tool had an axial movement. For large gears the problem of obtaining uniform rotation of the blank during the cutting stroke has not been solved and large gears produced by planers employing this method have been far from satisfactory. The Mesta Machine Co., Pittsburgh, experienced considerable difficulty from this source as, prior to the development of the present planer, it was a heavy purchaser of herringbone gears of large size for use in connection with its numerous mill installations.

In order to obtain correctly cut gears suitable for rolling mills, work was started in the engineering department of the Mesta Machine Co. on the design of a herringbone gear planer in which the tool only would move and the gear blank would be held absolutely rigid during the cutting. After more than a year of study and design, the gear cutter shown in the accompanying illustrations was evolved. The unquestionable originality of this gear planing device has been acknowledged by the United States patent office which recently granted all of the 34 claims set forth in the application for letters patent.

The machine itself occupies a space of approximately 26 x 26 feet and weighs complete, about 150,000 pounds. The main drive is by a 35-horsepower reversing motor while the index head and the pump are both driven by 5-horsepower motors. The diameter of the gears which can be cut is governed only by the pit capacity. At present gears up to 22 feet in diameter can be accommodated. The maximum face is 5 feet, 6 inches.

Forms a True Helix

The curve described by the tool during each cutting stroke is a true helix within limits of .0005 to .001 inch. Errors due to deformation of tool and support, and to wear of working surfaces are exceedingly small because all parts were made of more than ample size in order to reduce such errors to the lowest possible minimum. As a result the Mesta herringbone gear planer, judging from the gears produced on it, is one of the most accurate machines doing this type of work in existence. The Mesta Machine Co., is therefore, in position to furnish thoroughly satisfactory gears and pinions for severe mill service.

Fig. 1 shows a view of the gear

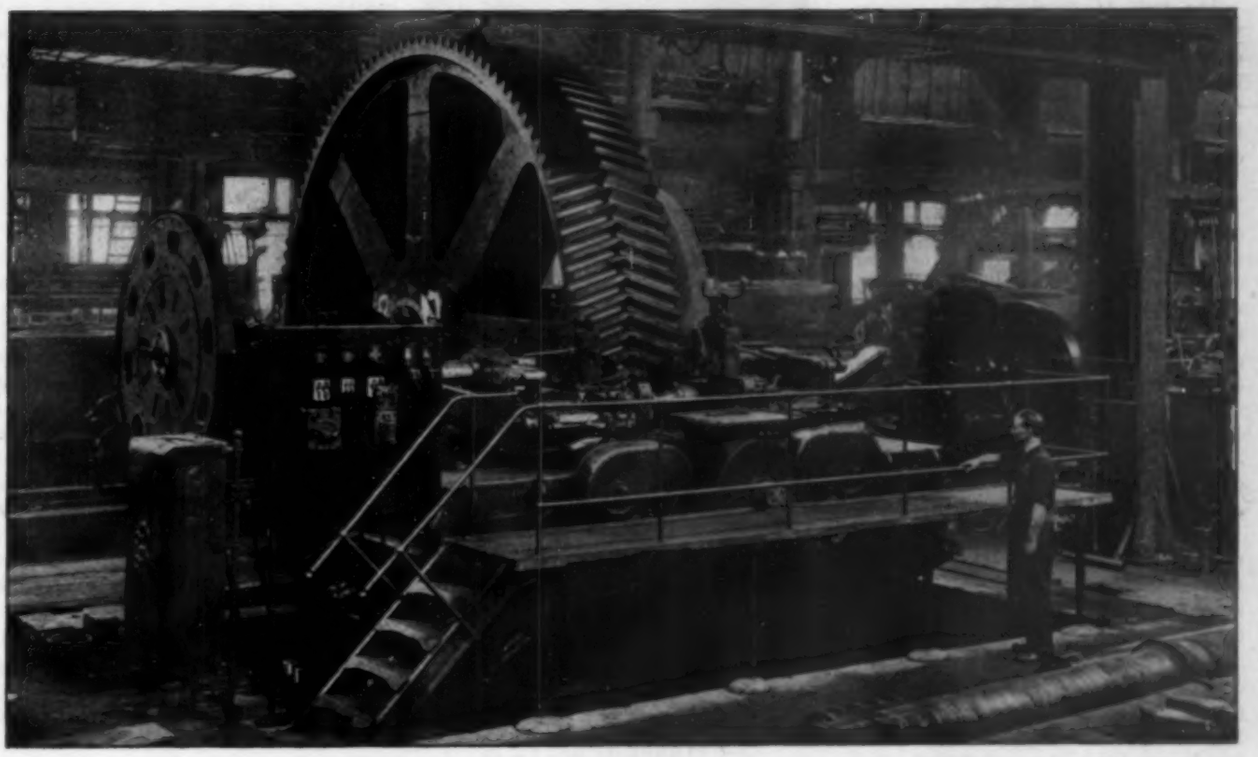


FIG. 1—NEW PLANER FOR CUTTING HERRINGBONE GEARS AND PINIONS

FIG. 2—BLOOMING MILL PINIONS CUT ON THE NEW GEAR PLANER

planer in the West Homestead plant of the Mesta company. The blooming mill pinions, Fig. 2, and the large gear for a motor driven mill, Fig. 3, are examples of the work that can be done on the new planer.

Acid Resisting Alloys

The task of developing an acid resisting alloy is difficult, and numberless experiments have been made along this line. The importance of such experiments is apparent. They have effected large savings in the manufacturing chemist's plant.

In a paper by W. C. Carnell entitled "Acid Resisting Alloys," presented recently before the American Institute of Chemical Engineers, a number of interesting experiments are described. The advent of fused silica, according to the author, has done much to solve the problem. Sulphuric acid had offered an apparently insurmountable barrier and it was thought that the use of platinum could not be avoided where sulphuric acid was made commercially and in any great quantities. Fused silica, it is said, was so satisfactory that a 10-ton cascade concentrating plant was erected to replace a platinum outfit. Difficulties are encountered in the use of silica, however, as it is very brittle and must be handled with great care.

Silicon-iron alloys have been used successfully in the manufacture of sulphuric acid and are now used in all forms of concentrating vessels and cooling devices for acid concentration. It is said that the success of the modern tower system is due to the use of silicon-iron alloys in pipes and fittings. In the manufacture of nitric acid, silicon-iron alloys have been used to a great extent. Owing to the increased production of this acid early in 1915, silicon-iron castings were adopted because of the shortage of stoneware suitable for nitric acid manufacture. It is said that the alloys have given just as high grade a product and are being used in preference to the brittle stoneware.

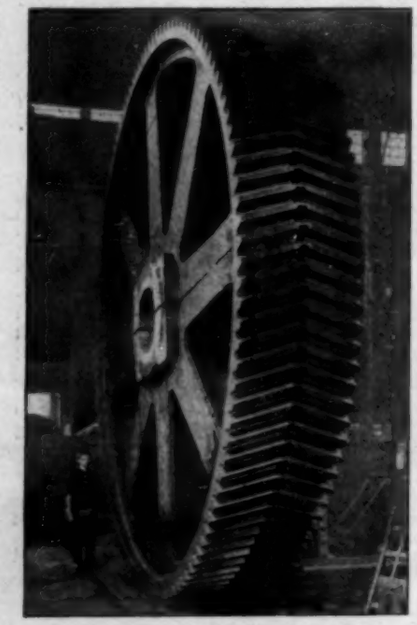


FIG. 3—LARGE HERRINGBONE GEAR FOR MOTOR-DRIVEN MILL. THE SIZE OF GEARS CUT ON THE NEW PLANER IS ONLY LIMITED BY THE DEPTH OF THE PIT

It is believed that greater progress can be made in the production of acid resisting alloys and to this end chemists are devoting considerable time and thought. Until the present time, the most successful experiments of this nature have been made with an alloy containing silicon and it is believed that future developments in the manufacture of acid resisting alloys will result from the use of silicide of iron.

Book Review

The Heat Treatment of Tool Steel, by Harry Brearley; 218 pages; cloth; published by Longmans, Green & Co., and furnished by *The Iron Trade Review* for $3.50 net.

With recent advances in metallurgy, including improved methods of microscopic examination and temperature measurement, more and more interest has centered upon the heat treatment of the steel. To quote the author, "The ultimate value of a tool may depend as much on the manner in which it is worked into its finished shape, as on the material from which it is made." In the first two chapters the author discusses rather briefly the structure and classification of steel and the raw material and manufacture of crucible steel. Following this is a very interesting chapter on the properties of ingots as modified by casting temperature, method of casting, shape of the ingot mold, etc., and another on fractures and external appearances. The changes brought

about in the physical properties of steel by forging, annealing, heating and cooling, hardening, tempering and straightening form the subject matter of subsequent chapters. Causes of defects in tools are given with an explanation of how their origin may be determined. In addition the book contains descriptions of a hardening plant and of various types of pyrometers. A discussion of the influences exerted on the properties of steel by alloying metals, either singly or in combination, so far as they intrude themselves into the general practice of tool making brings the book to a close.

Manufacturers New Condenser Equipment

The Ingersoll-Rand Co., 11 Broadway, New York, has secured the patent rights for a new barometric condenser of the counter-current type, in which air and cooling water flow in opposite directions. The steam inlet is at the bottom of the condensing vessel, with the water inlet above and the air removal opening at the top. The sheets of cooling water overflowing at the inlet point meet the entering steam and the two are brought into contact by conical baffle plates which assist the water to absorb the latent heat of the steam. The non-condensable air thus liberated rises through the falling water to the removal point at the top, being cooled to practically the temperature of the incoming water.

The steam inlet is of large diameter to secure low velocity and is hooded in such a way as to discharge the steam into the center of the condensing vessel. The air removal opening is also of large area and is protected by a self-draining baffle and trap. This helps to prevent water being carried over into the vacuum pump. A view of the condenser is shown in the accompanying illustration.

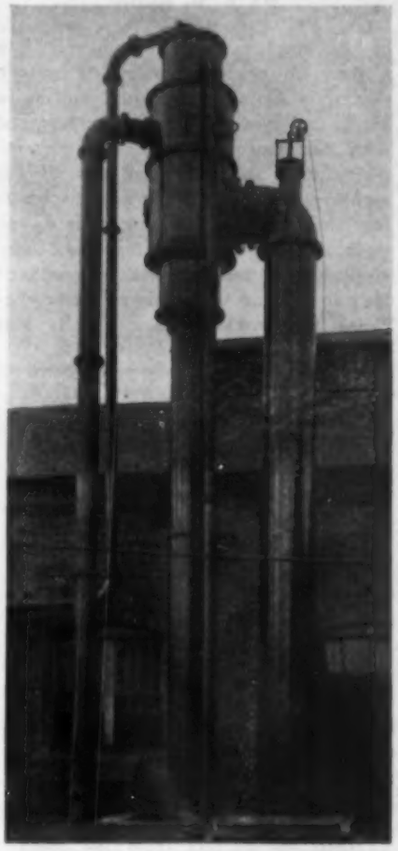
The Ingersoll-Rand Co. is also manufacturing vacuum pumps. They are high-speed reciprocating machines, wholly enclosed, automatically lubricated and are said to effect unusual economy in floor space.

Water pumps for elevating cooling water to the condenser heads are also manufactured, but where the level of the cold well is of sufficient height above the hot well, the condenser will lift its own cooling water, dispensing entirely with a water pump.

The courts of New York state have held constitutional a law which prohibits the seven-day work week in factories and mercantile establishments. A similar law has been recommended for the state of Illinois.

New Edition of Commercial Register

The twenty-fifth annual edition of Hendricks' Commercial Register of the United States, which has just been issued, rounds out a quarter of a century in the life of this standard publi-



BAROMETRIC CONDENSER MANUFACTURED BY THE INGERSOLL-RAND CO.

cation. The work is especially devoted to the interests of the architectural, contracting, electrical, engineering, hardware, iron, mechanical, mill, mining, quarrying, railroad, steel and kindred industries. It contains about 350,000 names and addresses with upward of 45,000 business classifications.

There are 1,512 pages of text matter. The index of the contents covers 149 pages and includes over 50,000 trade references. A list of trade names, brands, titles of identification, etc., is published for the first time and numbers 202 pages. This list furnishes ready reference to distinctive products manufactured by firms listed in the work.

An article entitled "Research in Corrosion Resistance", which was published in the March 9 issue of *The Iron Trade Review*, has been reproduced in booklet form by the American Sheet & Tin Plate Co., Pittsburgh. This article, which was written jointly by D. M. Buck, metallurgical engineer for the company, and J. O. Hendy, director of the Pittsburgh Testing Laboratories, Pittsburgh, has attracted considerable attention in the iron and steel industry, following as it does an article on similar lines describing the results of comparative tests of copper-bearing and other steel sheets, which was publihsed in *The Iron Trade Review* of June 10, 1915. In its present book form, the article presents a pleasing appearance, being printed in a large open type with illustrations conveniently arranged. For ready reference, a summary is included.

Tests of Davis Car Wheel

The American Steel Foundries, Chicago, manufactuer of the Davis car wheel which was fully described in *The Iron Trade Review*, Sept. 7, 1916, has had tests conducted recently to determine the flange strength. These tests were made by Prof. L. E. Endsley.

Wheels which had never been in service were used for the tests, the wheels being placed in a horizontal position. The first test consisted in applying static loads in a lateral direction to the flange. The wheels were then given an impact test in a lateral direction to the flange. In each case the load was applied through a special block, the lower section of which was machined to the same contour as the head of a standard rail section. The static tests were made on a Riehle testing machine. In the impact tests the relative flange strengths were determined by dropping a 1,640-pound weight from varying heights upon this block.

Under the static test, the average load required to break the flange was 381,000 pounds. In the impact test, the wheels were first given 50 blows at 10 inches without failure. The height was increased to 20 inches and five additional blows given. The height was doubled to 40 inches and five blows given without failure. Only at a height of 80 inches did the flange fracture and in several cases they withstood eight blows at this height without fracture.

These wheels are cast with a manganese-steel tread and flange and a ductile plate and hub. Each wheel is tested for uniform hardness and undergoes a severe drop test. The wheels have been in service for a number of years and the results are said to be highly satisfactory.

Removing Causes of Crane Accidents

Most of the Danger of Crane Operation is Due to Carelessness—The Adoption of the Precautionary Measures Outlined in This Article Should Improve Conditions

BY F. H. ELAM

IN SPITE of the fact that engineers and manufacturers have devoted their best efforts for years to the design and construction of cranes that will efficiently and safely perform the work for which they are intended, there is still a large element of danger in the daily operation of this kind of equipment. Even the manager of a new plant, equipped with the latest type of cranes, is not relieved from troubles due to accidents, for although the equipment is perfect in every respect, there is still an opportunity for man failure.

The human machines that operate and repair this up-to-date equipment are not standard and never will be. Guards will be removed during repairs and not replaced, or safety devices will not be used according to instructions, and there and other failures and omissions will cause workmen to be injured and possibly killed. The plant manager will have to call upon his resources of fortitude and patience to keep from losing faith in the efficacy of safety endeavor.

As in other equipment, every movable part on a crane should be guarded. The various state laws in effect require it, and it is necessary. If some part that seems to be protected by its inaccessibility is left unguarded the foreman is likely at any time to have cause that will warrant his subscribing to the theory of the late Mr. Darwin when some workman proceeds to qualify, both physically and mentally, as a missing link by climbing to that particular place and satisfies his curiosity to see if the thing really moves, with results that are usually painful to himself and to his employer.

Employer Striving for Safety

A reference would not have been made to this type of workman, if it was not a fact that it is such workmen who resist all efforts to provide for their safety by refusing to follow safety instructions, by removing guards and even destroying them. There seems to be a disposition to ignore or overlook this situation and to continually lay stress upon the duties of the employer. The employer has a duty to perform regarding safety that only he can discharge, and it is firmly believed that he is performing with far more earnestness and sincerity than the rank and file of his employes are performing and discharging their duty regarding safety for their neighbors and themselves. The employer is decidedly at a disadvantage in dealing with this situation, because the workmen are usually not recognized as being unduly careless until an accident has occurred. The damage has then been done, and it is too late to do anything except patch him up and pay the costs.

The trolley is the seat of the vitals of a crane, and should be so constructed and guarded that loose or broken parts cannot drop through, endangering the men below, and that men cannot be injured by the moving parts. The various parts of the trolley should be easy of access for repairing and cleaning.

Brake magnet plungers and counterweights seem to have an uncanny faculty of becoming unattached and falling at the exact moment that a workman is in the proper position to receive them on his head, and should, therefore, be securely fastened or guarded. Two-member hinged guards should be used wherever possible for gears, and should be securely fastened to the trolley frame. Main and auxiliary hoists should be equipped with effective limit switches, which should be kept in perfect repair. Cables should be used as the hoisting agents, and the use of the chain should be discouraged, as cable has many times the safety factor that chain has, besides being cheaper. Bridge and trolley wheels should be guarded by stirrup type sweep guards. The use of wire brushes for this purpose should be prohibited, for the reason that if adjustment is not perfect, the brush is likely to clamp a hand or foot to the runway rail instead of pushing it away.

Crane walks should be substantially built and should be above the bridge drive shaft, if possible. If this is not possible, the shaft, motor, gears, etc., should be safely guarded. The walk decking preferably should be of checkered steel plating. Railings should be substantial and of proper height with a toeboard to prevent tools of repairmen and other objects, from falling.

Crane cabs or cages should be commodious, and equipped with proper railings, toeboards, enclosed resistances, switches that can be quickly cut-out, and that can be locked while repairs are being made. All controller levers, counterweights, etc., should be securely fastened to prevent parts from becoming loose and falling.

Qualifications of a Good Crane Operator

A craneman should never be allowed to operate a crane until he has passed a satisfactory physical examination, and is known to be free from physical defects, such as epilepsy, fainting spells, defective heart, etc., and is not addicted to the use of drugs or alcoholic liquors. He should be thoroughly acquainted with every detail of the crane equipment, and understand the proper uses of same.

Cranemen should never attempt to make adjustments of any kind while the crane is in motion. A craneman, in violation of this rule, was running a crane equipped with a sandbox. The sand was not running as freely as he desired and he reached up while the crane was in motion to shake the dis-

Care of Cranes

THE design, construction, maintenance and operation of electric traveling cranes present a serious problem to the manufacturers and users of this equipment. A discussion of the subject, relating particularly to features of construction involving considerations of safety, was published in the April 20 issue of The Iron Trade Review. H. A. Shultz, author of the article, described various details of design that are absolutely essential to safe operation, and recommended factors of safety for important parts of the crane structure. The accompanying article by Mr. Elam, is a timely supplement to the discussion presented by Mr. Schultz, in that it treats the subject from the standpoint of the men who are responsible for the care of cranes and chains.

Presented at fifth annual safety congress of the National Safety Council, Detroit, Oct. 17-20, 1916. The author is manager casualty department, American Steel Foundries, Chicago.

charge pipe, and the bridge wheel ran on the projecting end of a finger of his glove and before he could jerk his hand away the wheel crushed off the end of several fingers.

Repairing or oiling should not be allowed while cranes are in operation. Workmen performing these operations should place their lock on the cut-out switch to insure their safety and the safety of others, and the lock should remain there until the work is completed.

An instance is cited wherein a repair gang was working on a crane trolley, but had not locked the cut-out switch. Before the repairs were completed a hurry-up call came to repair a crane that had broken down while pouring a heat, and the gang quit work on the first crane to go to the second one, leaving a gear from the trolley lying on top of the girder. The men left no sign or other notice that the job was uncompleted. Before the repair gang returned, the crane was needed and a craneman was ordered into the cab, and he started to move the crane trolley, with the result that the gear laying on the girder was brushed off, and fell on the head of a workman below.

It is interesting to know that such accidents seldom result from a single cause, but are usually the result of a train of failures to do the proper thing.

Cranes should be inspected daily by some one who is assigned regularly to that work, and a craneman should no more think of starting on the work of his turn without giving his crane an inspection than a locomotive engineer would think of starting on a run without inspecting his locomotive.

Precautions for Repairmen

In making repairs to cranes, repairmen frequently, in carrying repair parts to the crane, travel along the crane runways. This practice should be discouraged, if possible, and other means or routes should be taken, as this is one of the points where serious accidents frequently occur. If this practice cannot be obviated, every precaution possible to prevent an accident should be taken, and sufficient warning or notice to all the crane operators on the runways should be given.

It is frequently necessary for workmen to be on portions of crane runways while installing equipment in a shop. When this occurs the portion of the runway in use should be protected by clamps attached to the runways that will prevent cranes from running to that position, and constant vigilance by foreman and safety men should be exercised to see that such precautions are maintained at all times.

In installing a set of swing girders in a certain shop, it was found necessary to attach shafting to the bottom of the girders supporting the crane runway. The work was being done after the regular work hours in that department, and all parties had been notified every time the work was undertaken and clamps had been attached to crane runway rails. The work was nearly finished, and on the last evening the erecting men concluded that they would not take the trouble to put on the clamp stops as things seemed quiet in the shop.

How an Accident Occurred

The foreman in the shop had occasion to move a casting and ordered a man up into a crane who was not regularly employed in that portion of the shop, and he knew nothing of the work that was being done on the crane runway. The crane was started, and, as there were no warning signals, the crane operator did not observe the workmen on the opposite runway from the cab, and, there being no stops on the rail, he ran into the men before they could get out of the way or before he could stop the crane, killing one man and seriously injuring another.

All chains used in connection with cranes should be carefully adapted to the need of the service that they are to be used in, and should be made of the best grade of iron obtainable. Most shops are short on crane service, and to overcome this shortage heavier loads are handled than should be. To do this longer chains are constantly being slipped into service by the shop foreman, with the result that workmen are in constant danger of an accident due to a failure of one of the strained links. Most chains are made of lighter material than should be allowed for the loads that are to be handled. For these reasons if careful attention is paid to the length of the chains, and if they are kept as short as possible, a safety feature is established that is not always recognized. An easy way to determine whether chains are strong enough for the service required is to anneal the chains. If after annealing, the chain links continue to hold their original contour or shape in service it is certain that the chain is strong enough. If the links become elongated, and the chain as a result becomes ropy or stiff, the chain is not as strong as it should be. This test is the only reason for annealing chains. Most crane sling and hook chains in foundry service are made of ⅝-inch stock, which is a handy size to grasp and is easily handled by the chainmen.

When a chain comes from the maker the links have a property or quality that has been imparted to the metal in the manufacture that seems to be what may be termed a temper, although the carbon contents of the iron or steel is so low that it is negligible. When a link of this new chain breaks, it snaps without warning, and with a crystalline fracture which shows that it has hardness. Take two pieces of new chain and anneal one, then pull both on the testing machine, and the annealed piece will show far more elongation, and will break with a fibrous fracture, giving visible warning before breaking; the unannealed piece of chain will show tensile strength of several hundred pounds over the annealed piece, but will break with very little elongation and without warning. This extra strength is a false element and is the cause of many accidents.

It is the opinion of the writer that annealing does not correct defects in chains, unless they have been subjected to overheating, and that seldom occurs in foundry practice. Annealing does not mend or cause the minute separations that follow overloading to reunite, and the annealing of a chain would never be attempted if it was not for the fact that annealing removes this false element of strength, due to hardness, and reveals the fact that light weight chains are being used in such a way that foremen and men cannot overlook the evidence.

Chains are Dangerous

The use of chains is always attended with danger on account of the links parting without notice, pinching the hands and fingers of chainmen, and causing other injuries. The person who finds a way to use cable for sling material will be a public benefactor. To prevent an injury to the hands of chainmen the use of leather mits should be encouraged, as the mits prevent the fingers from getting into the links, and allows the hand to be withdrawn if the mit is caught at any time.

As has been previously stated, there is a tendency to handle excessive loads, and care and constant supervision are necessary to prevent this practice. If there is any uniformity of the materials to be handled, this simplifies the matter greatly. Chainmen should be instructed never to lift a miscellaneous load—such as different sized flasks—if it can be avoided,

and the cranemen should be instructed to refuse to move a load that he considers dangerous. This rule may cause some friction, but it is better to be safe than sorry, as the slogan goes.

A proper method of communication between chainmen and cranemen is one of the essentials in crane operation. If chainmen work in pairs there should be a senior chainman, who should give all signals, and the cranemen should take signals from him only. Many shops provide whistles for the chainmen to give signals with, but signals given manually are preferable, especially if more than one crane is in operation in a shop at a time, as there is less likelihood of a wrong signal being given or of the signal being misunderstood.

Some cranemen seem to be unfortunate in that they have more accidents than their fellow workmen. A record of accidents under each craneman, when analyzed, will often reveal where the cause of this seeming misfortune lies, and it will usually be demonstrated that the unfortunate craneman is an inefficient one. To obtain efficient crane service, it is necessary that careful attention to all the details of crane operation be given, and cranemen, chainmen, and others must follow without deviation the rules that are adopted for their guidance and government, if accidents are to be prevented.

Powdered Coal Burners

Of particular interest to engineers is the installation of pulverized coal burners put into operation recently under the boilers of the Parsons, Kan., power plant of the Missouri, Kansas & Texas railroad. The equipment consists of complete burners for use under eight Heine water-tube boilers which, previously, were heated by either natural gas or oil. The coal used is obtained from mines in Kansas, Oklahoma and Texas. Various tests which have been made with the soft coals and lignites from these mines indicate that they may be burned without destructive effect upon the fire-brick walls of the furnace. According to the Fuller Engineering Co., Allentown, Pa., which had the contract for the installation, the coal burners give an effective distribution of heat through the several passes of the boiler without excessive stack temperatures. Such ash as may lodge within the heating passes may readily be removed with an air blast. The evaporation obtained in the tests, with 16 per cent CO_2 in the stack, was 10.7 pounds of water per pound of combustible from and at 212 degrees Fahr.

Iron and Steel Problems in Spain

IT IS easy enough to conjure up pictures of looted gold, doubloons and pieces of eight in connection with Spain but the more prosaic mediums, iron and steel have a far less picturesque aspect. The iron and steel industries in Spain are interesting and are commanding considerable of the attention of the Spanish government. A recent state investigation on the iron and steel situation in Spain and Spanish provinces revealed a number of important facts.

Nearly half of Spain's iron ore comes from the province of Vizcaya, which yields between 3,500,000 and 4,000,000 tons annually, a relatively small amount when compared to the annual iron ore production of the Lake Superior district in the United States, but large when the total production of ore in Spain may be considered at 10,000,000 tons. It was found during the government's investigation that nearly 9,000,000 tons of ore out of the 10,000,000 tons produced were exported during 1913. The major portion of this ore was mined near the coast. Although the Spanish ore is of excellent quality, manufacturers have been unable to develop that branch of the iron and steel industry which converts the raw material into pig iron. The economical operation of blast furnaces has been an impossibility owing to the scarcity of coal and to the lack of proper blast furnace facilities.

A number of blast furnace projects have been started only to meet the fate already gripping many plants, the lack of necessary raw materials. Some furnaces have managed to overcome this difficulty and among these more fortunate plants are those at Sestao and Baracaldo. Modern coke ovens are maintained at both of these furnaces as well as rolling mills for rolling rails and sheets. These two plants with a third known as the Iberia, formed a combination in 1902, known as the Altos Hornos de Vizcaya, one of the most powerful metallurgical enterprises in Spain. This combination controls its own ore mines and carries its operations through the successive stages of manufacture to the finished product, machinery and hardware of various kinds.

There are also important furnaces in the Asturias and the imperial government maintains a plant at Trubia, Asturias, for the production of special armament steels and projectiles. These plants are modern in every respect and are constantly assuming greater importance.

The provinces of Leon, Palencia and Verona produce about 400,000 or 500,000 tons of coal annually and the provinces of Barcelona, Teruel, Guipuzcoa, the Balearic islands and Zaragoza produce about 275,000 tons of lignite. At comparatively accessible distances from the furnaces in these provinces considerable lead and iron ore has been mined.

The commission which deliberated on the question of the iron and steel situation in Spain delivered a report which suggested that iron ore and iron and steel in unfinished state should not be exported and in the finished state only after the domestic needs had been met. A board will be appointed at a future date to regulate the price of iron and steel based on wages paid at the different mines and on conditions peculiar to special localities.

Tests of Rail Joints

The American Railway Engineering Association, under the supervision of H. B. McFarland, engineer tests, Atchison, Topeka & Santa Fe railroad, recently made several interesting tests on the strength and rigidity of rail joints. The object of these tests was to show the effect of various percentages of carbon on the physical properties of untreated angle bars, as compared with bars of similar composition and section that had been quenched, and also to show the influence on the strength of the joint, resulting from the use of oil quenched, medium carbon steel track bolts as compared with the untreated, low carbon steel track bolts.

As a result of the tests, it was shown that the strength and rigidity of the track joint are dependent on the strength of the joint bar. It was evident that the strength of the material varies with the carbon content when other elements are constant, providing the material is handled in the same manner in the heat treatment as in the quenching. The results indicated that proper quenching raises the yield point of the steel.

Making Blast Furnace Work Safe–II

The Second Installment of a Manual Dealing With the Prevention of Accidents in Blast Furnace Plants—Much of the Danger Surrounding the Workmen Can Be Easily Eliminated

BY FREDERICK H. WILLCOX

IN PUTTING water in the skimmer trough do not stand near by with a short nozzle as indicated in Fig. 9. If the water strikes hot slag, the steam may scald you, and if it strikes a pocket of hot molten iron there may be an explosion. It is safer and just as effective to use a pipe, 15 feet or more long, turned down at the end as shown in Fig. 8. If it is necessary to break up crusts or skulls in the trough before turning water on, don't use a cold or wet bar. When handling hot scrap or slag use tongs or a hook whenever possible, and be careful in breaking or barring slag and scrap to avoid flying pieces, falls, or dropping material onto your feet. Before throwing scrap or cinder into a car be sure there is no one in it and that the pieces do not project over the end or sides of the car where they may fall or be pushed off.

Do Not Take Chances With Gas

Be careful that the gas or blast is not turned into or gas drafted back through a stove that is being cleaned. Do not open or close any doors or valves or remove any signs or locks on such stoves until the foreman has told you to do so. Before turning gas into a stove, warn any well-bottom cleaners working about the doors. If you think that the stove is not hot enough to light the gas, put a large bunch of burning waste at the gas door or provide other means to ignite the gas. Don't stand by the burner after turning gas into the stove; step away quickly. At times the gas will not light until it reaches the top of the well or combustion chamber, and it is then likely to light explosively and puff out through the burner and air doors. Be especially careful when you are turning on gas from a furnace just blown in or from one shut down on account of leaky tuyeres, coolers, bosh plates, cinder monkey, etc. In case of doubt always use burning waste; don't let the stove fill with gas and then try to light it. If the stove does not light, shut the gas off and start over again, using burning waste.

FIG. 9—UNSAFE WAY TO WET DOWN SKIMMER TROUGH

Steam from hot slag and exploding metal will injure the man who uses a hose with a short nozzle. A long hose is effective and safe

How to Blow off Stove

Before you blow off a stove, warn men to keep away from the blow-off valve, and especially warn them away from the blow-off door if the stove is being shut down for a leaky tuyere, as the gas may be very explosive. Be sure that the blast is on the new stove before shutting the cold-blast valve of the stove being taken off. Don't let the hot-blast valve drop sharply onto its seat and don't let the blast slam the chimney valve into place; set the valves easily by hand. Open the cold-blast valve slowly to avoid racing the blowing engines.

In case of the blast stopping unexpectedly from any cause shut the mixer valve on the by-pass at once, then close the cold-blast and hot-blast valves as soon as possible. Never forget to close the mixer valve before checking or shutting down the furnace, beginning a

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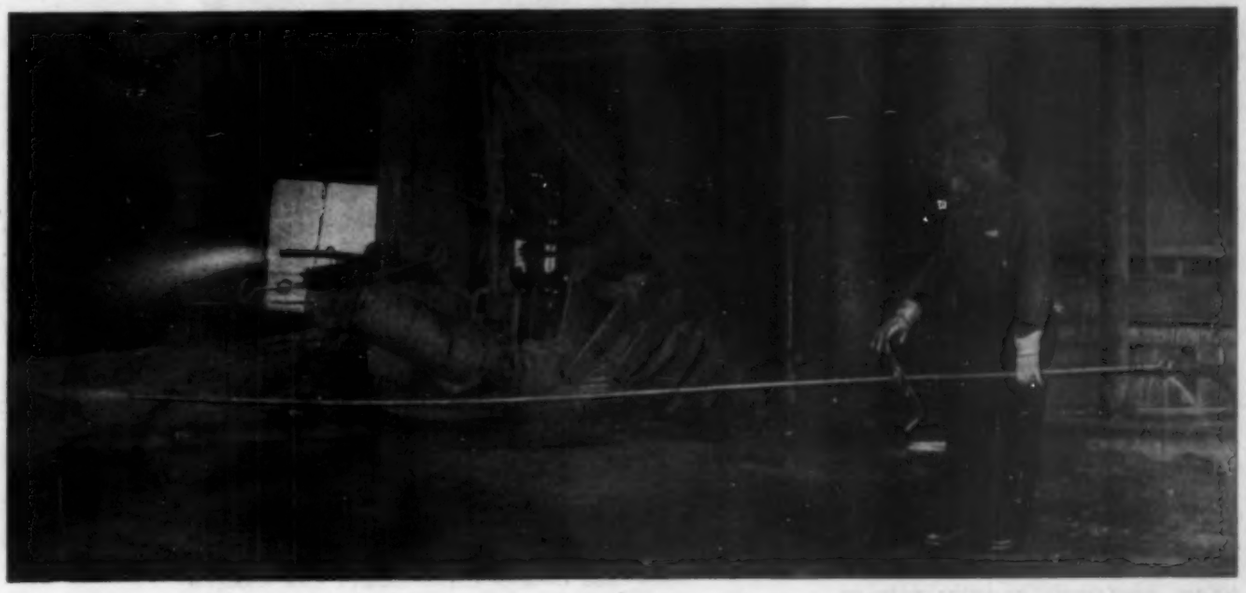

FIG. 8—SAFE WAY TO WET DOWN SKIMMER TROUGH

The long pipe enables the workman to effectively direct water into the trough and eliminates danger of injury from exploding metal

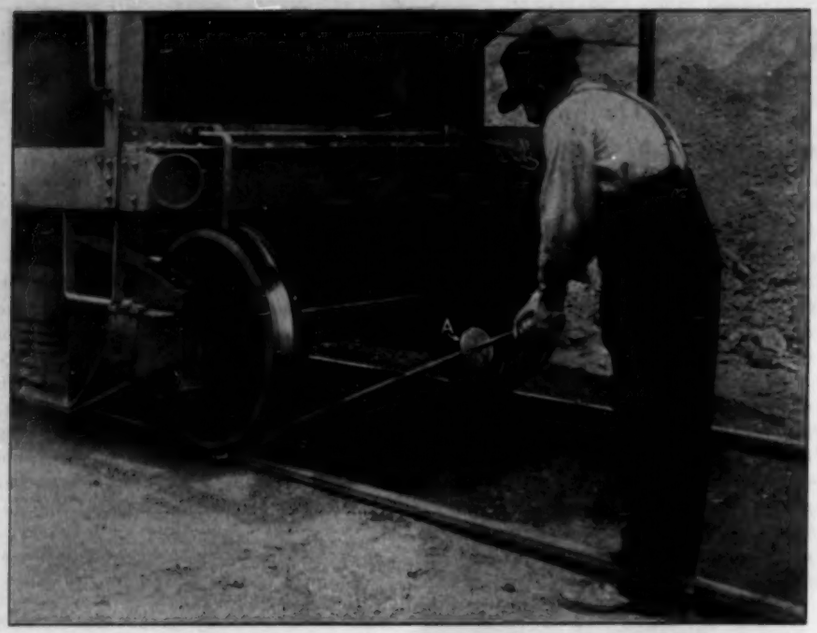

FIG. 10—A SAFETY PINCH BAR
The fingers of this man's hands are not in danger of being smashed because the disc *A* prevents the end of bar from coming in contact with the rail

cast, or stopping the blowing engine. To forget to do this may cause an explosion that will wreck the mains and engines. When it is necessary to take the stoves off during a shutdown to "change bronze," or for a short stop, be sure the burners are closed tightly. When ready to start the furnace and bring the gas down, never turn the gas into the stove until the blower has given the signal. Be sure that the explosion doors or bleeders on the gas mains or dust catcher are closed during a shutdown; if any air gets into the mains there is always a chance of an explosion. Always follow the instructions of the blower in handling the top bleeder during a shutdown. Many serious furnace accidents are caused by operating bleeders and gas valves other than in the way ordered. The least change from orders may cause a terrific explosion. If the gas is wild in drafting it back in one stove at a shutdown, draft back through an additional stove at once.

Keep Away from Covers and Doors

Keep away from the dust legs and manhole covers on gas mains, from gas burners and air inlet doors, when the furnace is sticking and liable to slip. Be careful when you open an air door to see how the gas is burning; if too much gas is turned on, or if the checkerwork is dirty, the gas may flash back into your face. Keep and warn others away from these places. No one should handle burners, doors, or valves unless directed by the stove tender. Do not tighten any thumb or other nuts on doors or blow-off valves when the stove is on blast; you may be killed or injured by the bolt breaking. Watch the water on the hot-blast valve and seat, because water leaking into the stove may cause the furnace to slip or get cold; it will then be more dangerous. Report any gas leaks about the burners or mains; do not let them leak unnecessarily. When the millwright is examining the chimney valve for leaks do not change the stove from blast to gas. When the hot-blast valve and seat are being inspected be sure the chimney valve is kept open and that the gas is turned off. Before entering a stove to clean it, lock the cold-blast valve and gas burner shut, fasten the chimney valve open, and either block the hot-blast valve in its seat or disconnect the cable from the stem, or lock the windlass, and attach danger tags; be sure these things are done. Stop any leaks about the burner with clay as even a small leak may allow considerable gas to drift into the stove. It is always safest to close the burner door, but if this can not be done for any reason, turn the burner on its seat, away from the door or seal it off with a blank. When ladders must be used to get into a stove through the dome manhole do not try to carry tools up or down the ladder, use a hand line. Keep away from the well of the combustion chamber and do not sit on the bridge wall between the well and the checkerwork; the wall may give way. Boatswain's chairs for cleaning, tearing out, or repairing the well lining should be supported by tackle attached to the top of the stove shell when possible, and the chair, rope and tackle tested to double a man's weight before use. Anyone working in a boatswain's chair should wear a life belt attached to the chair-sling block. Do not use a torch inside a stove; use an electric light on a standard insulated extension cord and have an electrician make all connections. When it is necessary to clean checkerwork from the bottom or to clean out under the arches keep under the arches as much as possible to avoid bruises from falling brickbats, clinkers, or tools. It is best never to enter the bottom until everyone is out of the top. Always

FIG 11—MAN USING SAFETY CAR WRENCH
This disc prevents the man's hands from striking the side of the car. The short bend in the end of the handle prevents the use of a pipe extension on the wrench

wear goggles when inside a stove and do not remove the locks from the valves until everyone is out and the manholes are closed. In cleaning flue dust from the bottom of a stove be careful to avoid burns; the dust is usually hot and easily runs into one's shoes. Notify the stove tender, before opening the cleaning, air-inlet, or blow-off door to clean the well from the outside, and have him turn the gas off enough to avoid any danger of flame puffing back through the door at which you are going to work. In case the furnace is hanging, stop work until it slips and keep away from the cleaning door. In loading barrows with hot cinder or dust do not fill them so full that they will run over; handle them carefully, and warn others to keep out of the way. Bars and cutters used in cleaning wells should be handled with crossbars when withdrawing them from the stove. Keep away from the doors when gas is being turned in the stove.

FIG. 13—SAFE WAY TO HOLD BAR
If the sledge misses the end of the bar it will not strike the man holding the bar

Suggestions for Dust-Catcher Men

Empty the dust catcher regularly; if you let it get filled and the furnace slips, there may be an accident. Notify the foreman when the car is full and if the car is not moved promptly and an empty one spotted. Never dump the dust catcher when the wind is off the furnace or when the furnace is hanging or liable to slip unless you are doing it under the orders and directions of the foreman or superintendent. In dumping dust legs, dust pockets, or dust catchers be sure there is no one underneath to get burned, and warn men against approaching, as the dust may fly and burn them. Be careful in cleaning up dust and never step on it, because it will run like water when hot, and burn you severely if it gets in your shoes. Be cautious in playing a hose on hot dust, as it sometimes explodes or flies. Do not clean up under the dust catcher unless you have notified the foreman and he has told you to go ahead; the bell may be forced open by a slip or by being overweighted and the dust may burn you. For the same reason never go into a dust car after it is spotted under the dust catcher; pack the doors before the car is placed. Turn the water on full before you open the bell, and water the dust thoroughly when dumping the dust catcher. Don't fill the car with hot dry dust and then turn the water on; it will soak down slowly, and the contents may explode. Always place a card on the car so that the unloaders will know they are handling flue dust.

FIG. 12—UNSAFE WAY TO HOLD A BAR
The man holding the bar will be in the path of the sledge if it misses the bar

Danger Lurks Around Skip Hoist

Rod the furnace regularly and in case it is hanging or stiff report to the foreman promptly. If anyone is working in the skip pit, on the skip incline, hoist, or skip, don't move the skip, except under direction and after giving warning. If an oiler or handy man is working on the sheave wheels, bell rods, hoppers, distributor mechanism, or bell-rod cylinders, do not lower the bells except on signal from those on top. Never start the skip or hoist cage until you receive the proper signal, unless you have all regular charging operations in sight, and then signals are not required. When the blast is off, or when the furnace is shut down and men are working about the top or bottom, do not fill the furnace or lower the bells without warning the men away from the tuyeres and hoppers on top, and then only under the direction of the foreman. If the furnace is being shut down or if it is working irregularly and stops taking charges on account of hanging and slipping, do not put wet ore on the bell; at many plants it is considered dangerous to dump wet ore when the furnace is low. Report anything about the skips, bells, or indicators that does not seem right, such as skips striking the bumper blocks too hard, slack or frayed cables, irregular, slow, or quick movement of the bells, or water in steam

lines. By early notice an accident or possibly a hazardous delay may be avoided. Never let anyone go up the skip incline to the top alone.

Scale-car operators should watch for stock-house cleaners or others crossing the track and should always have the car under control. Watch out for overhead obstructions. Let the furnace millwright or electrician do all repair work on the car. Be careful not to leave ore or stone on the edges of the chutes; many accidents are caused by stock falling from the chutes. When barring or punching at the chutes or doors of the bins be careful to avoid a rush of ore or stone falling on your foot. Do not open the door of the nearly empty bin or get under it just as the car doors are dropped on the trestle; the material may easily fall through and bruise you, or if it is flue dust or sinter, burn you. Wear goggles when the coke is very dusty or when breaking ore or limestone. If steam is used to thaw ore in the bins or piles be sure that the hose is strong and in good condition. See that no one is in line with the nozzle when you turn on the steam. If gas is used, see that it stays lit and that a pocket of gas does not accumulate. Do not light gas by hand with a match, use burning waste, placed on the floor or in the chute.

FIG. 14—PROPER EQUIPMENT FOR MAN WORKING IN ORE BIN
This man is playing safe. If he slips or falls, the line anchored to the cross beam will save him

Most accidents with ore buggies happen from catching the fingers between the buggy handle and a column, wall, or other obstruction. Watch out for this and use safety handles. Be careful not to let the buggy leg come down on your heel, or to run the wheel over someone's foot. Never race with a buggy, you may easily lose control of it and receive a wrench, strain, or bruise. Watch that your fingers or feet do not get caught between a lump of stone or ore from the chute and the buggy or floor. Don't undercut an ore or stone pile, or let the stock lodge above you, keep it knocked down with a bar. Never stand close to the elevator pit as the cage comes down, ready to take the buggy off the instant the cage comes to rest, as many men have had their feet crushed in this way by getting them caught between the cage and the floor sill. Don't try to get on the cage before it has come to rest, or after the signal for hoisting has been given.

When it is necessary to clean the skip pit, notify the skip operator and do not go into the pit until he tells you to. Avoid walking under bin doors and chutes. Keep off the scale-car track and watch for the car when crossing the track. Don't stand on the track when signaling the car operator. Be careful that your bar does not touch a third rail or trolley wire. It is best not to ride on the scale car, and you should never jump on or off the car when it is moving.

When you enter the motor house or hoist-engine room notify the skip operator, both on entering and leaving. Keep away from the cast house and stoves unless you are required to go there to help. Report all bad places to the foreman, such as dark corners, overhead obstructions, poor track, holes, and unsatisfactory bin doors. Be sure to report every injury, as even a slight injury if neglected may have serious or fatal results. Even a bit of coke dust may seriously injure the eye if not taken out right away. If a man receives an electric shock free him from the source of current, being careful not to get a shock yourself, give him artificial respiration at once, and send for the foreman. Similar first aid is needed if anyone becomes gassed while working on top.

On hand-filled furnaces top fillers should remember not to step over trap or lift doors at the top of elevator shafts while the elevator is running.

The safety of many men about a furnace plant depends indirectly on the care and interest the stock-house crew take in their work. Careful weighing, regular charging, reporting any difference in appearance or quality of coke or limestone, and constant watching of the movement of the charge in the furnace will prevent many slips, messes and dangerous work at the tuyeres, tapping hole and furnace top. Watch for the larry car, locomotives, and cranes and do not go under the ore bridge just before ore is dumped into the bins. Do not jump on or off moving cars. Never sit on or near the track or bridge rails to rest; find a safe place. When you hear the warning whistle at the furnace get out of the car at once and under shelter as it means the furnace is hanging and may slip. When ore is being dynamited and a warning is shouted, get under cover and stay there until material has stopped falling. Do not try to jump across the bins from rail to rail; use the crossovers. They were put there to use and the minute saved by not using them is worth less than the good example set by using them.

Do not use a pole in spotting cars with a transfer car or locomotive on an adjoining track, use a cable with safety hand locks. If there is no cable and a pole must be used, stand on the same side of the pole that the coupler of the car is on. Be careful in pinching cars on the trestle, you may fall and receive a severe injury. Pinch a car the way the foreman has shown you, and report pinch bars with smooth heels or dull points to the toolman or foreman. A

pinch bar fitted with a disk and tool-steel heel as shown in Fig. 10 lessens the danger of injury. When turning on a steam jet to thaw ore see that no one is in line with the jet; use a clamp to hold the nozzle, and avoid working with worn hose. Watch that cinders from trestle locomotives, or hot coke, do not start fires in the coke bins or walks.

A safety car wrench for opening drop doors on cars is shown in Fig. 11. It is dangerous to open drop doors on loaded cars unless you know how. Do not try to do it until you have been shown and, if possible, have watched for a day men who know how. Before getting into a car to unload it, or crawling under a car to work on the drop doors, make sure, by asking the foreman or straw boss, that the car will not be moved. Wait until the doors are dropped before going on top of material in cars to be unloaded. When unloading hopper cars, do not stand over doors or on the edge of the material; it may slip and carry you down into the bin where you may be suffocated or severely injured. Obtain a firm footing in the bottom of the car between the doors, or be sure of a firm hold on the side of the car. By all means wear a belt and safety line, as shown in Fig. 14, if these are provided. Do not undercut material any more than is necessary and watch that the lumps do not catch you. Be very cautious in opening the doors of cars loaded with flue dust; if dry, it will fly out. Avoid stepping on flue dust in cars, for even apparently wet dust may be dry and hot beneath and cave when you step on it. Always get out of a car the same way you get in; do not crawl out through the doors in the bottom of the car.

Before you drop material into empty or nearly empty bins notify the stock-house crew so they can keep clear of falling material, and be sure that the bin doors are closed. In poking ore in bins and chutes see that you will not get caught in case a fall of ore catches the bar. Never go into any bin to shovel material or to clean the bin unless you have a belt with a life line attached to a girder or tie as indicated in Fig. 14. Use a flag or track torpedo to protect the bin you are working in, or ask the foreman for a watcher to hold the line and warn men not to dump material in the bin or run cars over it.

Keep Away From Dangerous Places

Stay out of cast houses, pig machines, boiler houses, and other places where your work does not require you to go, and keep away from iron and cinder ladles when they are being shifted. Whenever possible, keep from under cranes in operation. Always warn the crane man before beginning to clean the tracks about the granulating pit, as he may accidentally drop some hot slag over the sides of the car unless he knows you are beneath, or scalding water may run from the grab bucket as it is carried over your head. Be careful in cleaning up about a loaded cinder car as steam and scalding water may escape suddenly from a drop door. Don't throw wet or damp rubbish into cinder ladles, as it may cause an explosion, and in turning a hose on a leaking cinder or iron ladle stand as far away as possible, as you may be scalded by steam or burned by an explosion or shot if the water hits molten iron. Avoid walking on ash piles; they may be hot underneath and burn your feet if you break through. Keep your feet out of flue dust when cleaning it up. In loading or unloading cars, see that the gang planks or runways are in good condition and are properly placed and secured.

Use Tools Carefully

Be careful when handling heavy material or using tools, as most accidents about blast-furnace plants are caused in such work. Hold a bar as shown in Fig. 13, and under no circumstances take the position indicated in Fig. 12. When necessary to go on a roof or window ledge to clean windows always use a safety belt and a life line. When cleaning windows from a ladder do not overreach; go down and move the ladder if necessary. Be sure that the ladder is resting squarely at the bottom so that it can not slip. If the ladder is a long one have some one steady it. Always have at the top a cross piece long enough to span the entire window. The cleaner you keep the yard the better and more safely everyone can do his work. Don't let piles of rubbish accumulate, or pieces of lumber, brickbats, scrap, and other material lay around, or leave tools about; some one may stumble over them. Fill up small holes and depressions and report promptly any steam or hot water puddles caused by leaky lines.

Always wear goggles or a mask when working about the troughs while iron is being poured; be cautious when the molds are cold or if they have ice, snow, or water in them, and, especially when cinder is coming over, keep away as much as possible. When it is necessary to work under the strands to knock out the "stickers" keep from directly under the strand as much as possible, both the one you are working on and the adjoining strands. Men tending the lime vats and sprays should watch for stickers when it is necessary to go under the strands to adjust the sprays or to feed lime, while the machine is running. Aim to do such work between casts and shut off the steam when working about the sprays or vats. Before pouring examine the top of the ladle to see that there is no solid crust of cinder or iron frozen over the hot metal. Such crusts should be broken with a warm, dry bar as otherwise the metal will splash badly when it breaks through the crust. Never operate the motors, clutches, or hoists for pouring ladles or running the strands unless it is your job, or unless you are told to do so by the foreman. Keep away from around the sprocket wheels. Remove the scrap and clean the rails between pouring ladles or casts. Don't try to save a few seconds by stepping on or across molds in motion or containing hot metal; use the walks or go around if necessary. Be sure that the bars you use to bar scrap out of the troughs with are dry and warm and avoid using short poling sticks. Before releasing the ladle after pouring replace all safety dogs or legs in position.

When you are working about the rear of the machine wear goggles to protect the eyes from flying chips of iron or lime dust. Use care in loading cars to prevent side loading, overloading, and loading directly upon drop doors, and see that no pigs are left on the end frames where they may fall off.

When working on the pig-machine strands, or changing molds, see that motor switches are locked open, tagged with a danger sign, or that the clutch is fastened open. Avoid touching electric lines, motors, or light sockets, for where there is so much steam and metal floors as about pig machines, you may get a severe electric shock or burn. Keep sledges, cutters, and other tools in good condition, be careful in using them, and watch your hands and feet when handling molds or pigs. Report cuts, burns, and bruises promptly.

Safety in the Ladle House

Don't leave large pieces of scrap on the ladle spouts, they may cause accidents in shifting or pouring, and in removing them use a long bar and keep away from in front of the ladle; work from the side. Before trying to remove a bottom skull clear away all overhanging rim or side skulls and knock out any loose bricks. The bottom skull will then come out more easily and safely. Before removing a skull or cleaning a ladle be sure the ladle is securely blocked or propped. When trying to lift a rim skull out of a ladle with the crane don't stand on the rim of the ladle, the hook may slip and strike you or cause you to fall. Watch all ladles for iron frozen on the rim or spouts, skulls, and "hot spots" or signs of failure on the lining whereby hot metal might break through. A thin place in the lining is usually shown by the ladle shell becoming rusty red. Before using a ladle be sure it is dry.

Measuring the Viscosity of Oil

Several Existing Types of Viscosimeters Are Discussed, the Authors Believing That Most of These Are Subject to Error—A Meter Based Upon a New Principle is Described

BY H. C. HAYES AND G. W. LEWIS

IN DETERMINING the lubricating properties of an oil, the viscosity test is considered of great value, since by means of this test a good oil can readily be distinguished from a poor one. It is therefore very important that the engineer be able to measure the viscosity of an oil and also the variation of viscosity with temperature.

Matter in all states exhibits a gradual yielding to tangential forces which tend to change its form. This property is termed viscosity and may be defined quantitatively as the tangential force per unit area divided by the shear per unit time.

Viscosity is measured by means of viscosimeters, of which there are five types. In meters of the short capillary type, the liquid to be tested is forced either by gravity or by pressure through the capillary and the viscosity is determined in terms of the time required for a given volume to pass through the meter, as compared with the time required for a standard liquid to discharge the same volume.

Classes of Viscosimeters

A cross section of a meter of this type is shown in Fig. 1. The essential parts of the instrument are a cylindrical bowl, *A*, in which the oil is placed and a short capillary tube, *B*, through which it is discharged. The instrument must have temperature controling and measuring devices, means for starting and stopping the flow and volume and time measuring apparatus.

To this class belong the Saybolt meter, adopted as a standard by the Standard Oil Co.; the Engler meter, adopted as a standard by the United States government and Germany; the Redwood meter, adopted as a standard in England; the Scott meter; and the pipette, adopted as a standard by the Pennsylvania Railroad Co., and much used by chemists. The majority of the viscosimeters on the market are of the short capillary type.

In another type of viscosimeter, a solid body is dropped through a tube filled with the liquid, the solid body being usually a sphere or a plunger.

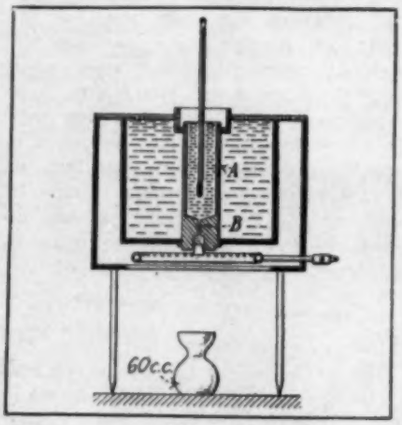

FIG. 1—SHORT CAPILLARY TYPE VISCOSIMETER

Meters employing this principle determine the viscosity in terms of the time required for the body to drop a certain distance through the liquid, as compared with the time required for the same body to drop through a standard liquid. To this class of meters belong the Perkins meter which employs a plunger and vertical tube, and the Flowers meter which employs a small steel sphere and a slanting tube.

The orifice type employs an orifice in place of the short capillary of the previous type. The Carpenter meter belongs to this class.

Meters employing an oscillating disc or cylinder determine the viscosity in terms of the damping which the oscillating disc or cylinder experiences when placed in the liquid as compared with the damping when placed in the standard liquid. The Doolittle meter is an example of this class.

A similar type uses a rotating disc or cylinder. This type determines the viscosity in terms of the speed of rotation of the disc or cylinder in the liquid under test as compared with the speed of rotation in the standard, the driving torque remaining constant. The Stormer meter is an example of this class.

In the capillary and orifice types of meters an acceleration error is introduced. Each of these classes is subject to another error due to difference in the surface tension of the standard liquid and the liquid under test. This error is prominent for those meters which discharge from the capillary or orifice into the air. As soon as the stream leaves the meter the film which forms on the free surface tends to contract, and thus decreases the cross section of the stream and retards the discharge. This contraction is greater for a liquid of high than for one of low surface tension.

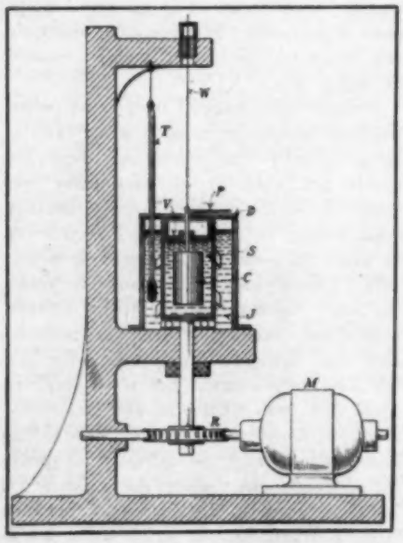

FIG. 2—THE NEW VISCOSIMETER

Critical Velocity Error

Another source of error in most capillary and orifice forms of viscosimeters is that the dimensions of the instrument are such that for the standard, which is water, the flow exceeds the critical velocity and the resulting turbulent flow makes the time of flow abnormally large. This introduces an error, which also adds itself to the acceleration and surface tension errors. This fact was discovered during the research work about to be recorded but has, in the meantime been noted and investigated by Upton who found the error so introduced by the Engler viscosimeter to be great.

The three errors—acceleration, surface tension and critical velocity—are prominent in all the meters named above as standards and we should expect the viscosity as given by these meters to be in general much too low. The experimental results will show that it is.

Those meters based on the principle of dropping a solid body through a tube filled with the liquid to be tested should be more accurate than the capillary or

Presented at the Spring meeting of the American Society of Mechanical Engineers, New Orleans, La., April, 1916. Mr. Hayes is professor of physics, Swarthmore College. Mr. Lewis is assistant professor of engineering in the same institution.

orifice forms as they are free from the surface tension error and usually from the critical velocity error. All are, however, subject to the acceleration error. All the liquid displaced by the falling body suffers acceleration. These meters are all of the flow type and may be regarded as of the short capillary form, the reduced section at the point where the falling body is passing being the capillary. The liquid flows across this section as truly as it does through orifice or capillary. The relation between the damping which an oscillating disc or cylinder experiences and the viscosity of the liquid in which it is immersed is complicated, and indeed the true relation is not known. Meters based on this principle, such as the Doolittle meter, do not give accurate results. They are nearly free from the surface tension and critical velocity errors, however, and though somewhat slow and difficult to operate, they give better results than the majority of flow types.

The constant speed of rotation which a disc or cylinder immersed in a liquid will attain under the action of a constant torque is a true measure of the viscosity of the liquid. The Stormer viscosimeter attempts to operate in accordance with this principle, but the friction of the moving parts is necessarily such that a constant torque cannot be obtained. With proper refinement, this meter could be made to give good results. The fact that a meter based on this principle can theoretically give accurate results has led to the development of a new viscosimeter now to be described.

This viscosimeter operates in accordance with the principle that a solid body having a surface of revolution experiences, when suspended in a rotating liquid, a torque which is proportional to the viscosity of the liquid. The instrument is shown diagrammatically in Fig. 2. The specimen, *S*, is contained within a cylindrical chamber which is caused to rotate uniformly by a motor, *M*, through a worm drive, *R*. A cylinder, *C*, is suspended within the specimen by a thin steel wire, *W*, so that the axis of the rotating liquid coincides with a cap, *V*, so shaped that the excess liquid can overflow when the cap is seated and thus give constant conditions within the chamber. The specimen chamber is surrounded by an oil jacket, *J*, in which a thermometer, *T*, is suspended. The jacket oil may be brought to any desired temperature by means of a heating coil, or a side coil not shown in the diagram. The cover, *P*, of the jacket chamber is provided with a scale which is marked in degrees or may be calibrated to read off directly, through the deflection of the pointer, *P*, the viscosity in terms of a standard liquid. The specimen chamber and the suspended cylinder are both made of copper to insure constant temperature throughout the specimen and the outside of the specimen chamber is provided with blades which keep the jacket oil thoroughly mixed as the chamber revolves and thereby exposes the latter to a uniform temperature. This is an important factor toward insuring constant temperature throughout the specimen. The experimental work has shown that the temperature of the specimen is uniform to within a small fraction of a degree. Moreover, the temperature of the specimen follows the temperature of the jacket oil so closely that the temperature-viscosity curve can be taken while the temperature is slowly raised or lowered. This proves to be a great saving of time. It also saves labor, for one does not need to stand by the instrument continually. The deflection of the pointer is at any instant a measure of the viscosity, so all that is required is to take simultaneous readings of temperature and deflection at intervals during the heating or cooling process.

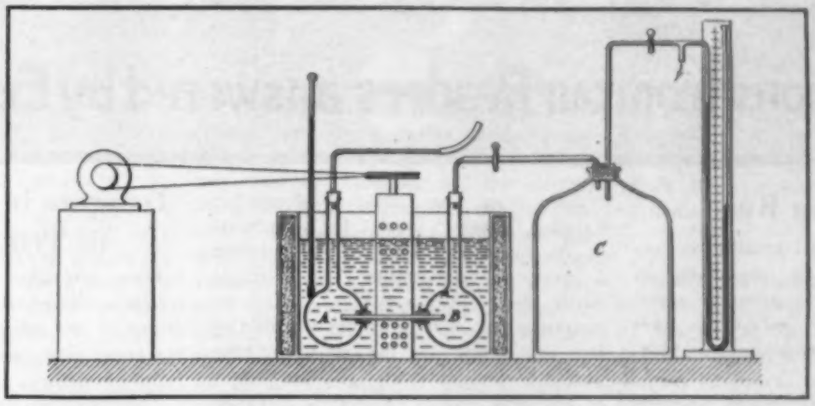

FIG. 3—CAPILLARY TUBE METHOD

To test the accuracy of this viscosimeter, the temperature-viscosity curve was found for a light and a medium gas engine oil by the capillary tube method, the apparatus for which is shown in Fig. 3. The oil was drawn from one vessel, *A*, to vessel, *B*, and

(*Concluded on page* 840.)

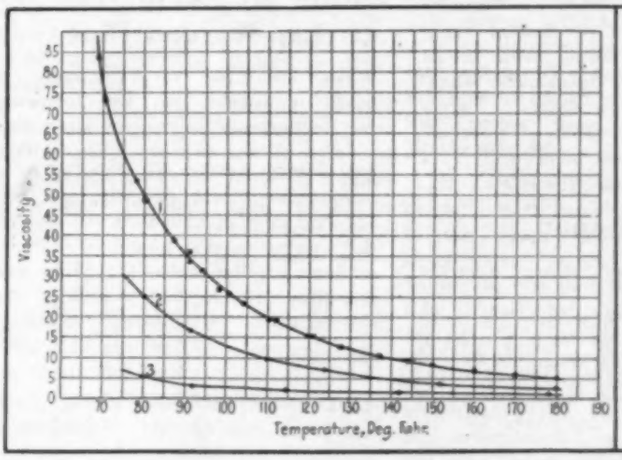

FIG. 4—VISCOSITY CURVES FOR MEDIUM GAS ENGINE OIL

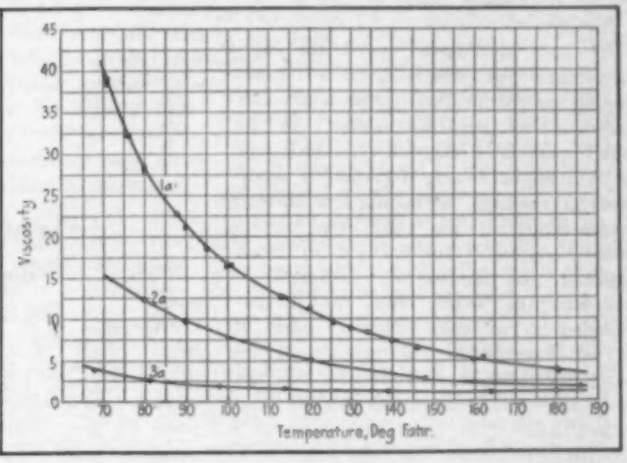

FIG. 5—VISCOSITY CURVES FOR LIGHT GAS ENGINE OIL

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

Preventing Rust

Please let us know if there is any satisfactory method of producing an anti-rust protection or coating of a metallic nature on iron and steel, other than by painting, galvanizing, electroplating, etc.

Possibly the Schoop metal spraying process wold serve your needs. By this process a coating of protective metal, such as German silver, brass, bronze, lead, tin, zinc, aluminum, copper, etc., is easily applied by means of a portable tool. This process applies not only to steel and iron, but to various kinds of materials and fabrics. The metals are heated to the fusing point and automatically applied in a spray. The coating metals are fed to the machine in the form of a dust or a wire of small diameter. The process is patented and the apparatus must be leased by the user.

Pyrometer Connections

We have a core oven fitted with an electrical pyrometer. We wish to connect this instrument to a nearby heating furnace. Kindly advise if this is practicable.

If your instrument is of the high-resistance type, simply insert a thermocouple in the heating furnace and connect it to the instrument. If the instrument is of the low-resistance type, it will be necessary, in order to secure correct readings, to maintain a uniform temperature at the cold ends of the thermocouples. One method of maintaining this temperature uniformly is to lead the wires from the thermocouples to a "cold junction" point 10 to 20 feet below the surface of the ground, where the temperature throughout the year remains practically constant, and from this point lead them to the instrument. Or, the leads from the thermocouples may be connected to a "compensating box", from which they are continued to the instrument. A compensating box contains an electric lighting system, which, by a contact of the make and break type, maintains a uniform temperature. In utilizing either the cold junction or the compensating box, it is necessary to calibrate the instrument to the uniform temperature thus obtained. It also would be advisable, before calibrating, to make the wires, connecting the thermocouples and the instrument, of equal length, since the length of the lead has some effect on the reading. With both high and low resistance instruments it is necessary to provide a switch, since the core oven and heating furnace temperatures cannot be read simultaneously.

Tungsten Ore and Metal

Will you please inform me how tungsten ore and metallic tungsten are sold; that is, as to weight and quality?

The usual trading of tungsten ore is in the form of concentrates with 60 per cent of tungstic oxide as the standard. The unit of sale is 20 pounds. In metallic form, tungsten is sold by the pound and is 95 per cent pure or better. Ferro-tungsten is sold by the pound and contains from 60 to 70 per cent, usually, and sometimes more of metallic tungsten, the remainder being made up of iron, carbon, silicon, manganese, aluminum, phosphorus and sulphur. Ferro-tungsten is the common commercial form used in the steel industry.

Fluor-spar

What is fluor-spar? Where is it obtained?

Fluòr-spar is a flux used in open hearth steel practice. Lump grades are used in the cupola. The principal element is calcium fluoride, which runs 85 per cent and over in the washed gravel grade. The silica should not exceed 6 per cent. Fluor-spar is mined in Illinois and Kentucky.

Dangers in Manufacture of Trinitrotoluol

What are the causes of illness to which workmen in trinitrotoluol manufacturing are subjected? What are the symptoms and what precautions should be observed?

The illness to which workmen in trinitrotoluol manufacturing are subjected is due principally to the escape of nitrous fumes evolved mainly in the manufacture of nitric acid and to the chlorine and chlorine compounds given off at the start of each working charge when not thoroughly absorbed in the towers. In some cases the illness is indicated by an irritating rash on the arms of the workmen. It is also identified in some cases by coughing, shortness of breath and fatigue which can not be ascribed to any other cause. Workmen should be warned not to breathe the heavy brown fumes and should always employ an air helmet when repairing leaks and when entering rooms heavily charged with the fumes. Remedies for acid burns must be applied immediately.

Widths of Skelp Iron for Lap-Welded Pipe

Pipes are used so extensively in various industries, that the following table undoubtedly will prove interesting to users of the product. The middle column gives the width of the skelp in inches, the gage thickness being given in the final column.

Size of pipe made.	Width of skelp, inches.	Gage.
⅛	1⅞	14
¼	1⅝	14
⅜	2⅛	14
½	2½	14
¾	3⅜	13
1	4¾	11
1¼	5½	10
1½	6¼	10
2	8	9
3	12	6
3½	13⅝	6
4	15⅝	4
5	18¾	4
6	22¼	2
7	25	2
8	29	1

Make Tests of Tin Plating Baths

Various Baths Described by Kern Were Prepared and Electrolyzed as Recommended—This Test, as Described in This Article, Showed that the Baths Were Not Satisfactory

BY FRANK C. MATHERS AND BARRETT W. COCKRUM

THE work of testing tin plating baths was undertaken at the suggestion of Dr. W. D. Bancroft, of Cornell University, who is chairman of a committee appointed by the American Electrochemical Society, in April, 1913, to investigate the problems of electroplating. Attention was directed towards tin on account of the great number of different baths for tin plating and the absence of any bath which is widely accepted by platers as satisfactory. This indicates that the baths, as described, do not produce wholly satisfactory deposits.

The demand for the electro-deposition of tin is very small on account of the easily executed process of tin-coating metals by dipping in molten tin.

Description of Apparatus

Each of the various tin baths described by Kern in his review of tin plating, published in the transactions of the American Electrochemical Society in 1913, was prepared and electrolyzed at 3.6 amperes per square foot under the prescribed conditions of temperature, acidity, stirring, etc. Two anodes of commercial tin, one on each side of the beaker, were suspended by iron wires in alkaline baths, by lead wires in complex baths where anode corrosion was good, and by platinum wires in the others. The baths were stirred occasionally with glass rods during the course of electrolysis. The cathodes were of iron or thinly rolled pure tin. In each case electrolysis was continued constantly for two weeks, the cathodes being replaced by new ones whenever crystalline or spongy growths seemed to produce short-circuits.

Classification of Tin Baths

The baths for tin plating seem to fall into three principal classes, as follows: Tin salts of mineral acids, with or without other inorganic salts or organic addition agents; alkaline baths, as sodium stannite, with or without other salts and simplex or double salts. Alkaline sulphides may also be used but were not tried out in this work.

Many of the difficulties in tin plating are unavoidable because they lie in the specific inherent properties of tin salts and in the pronounced tendency of metallic tin to be electro-deposited in a loosely crystalline or a spongy condition. Stannous salts easily oxidize in the air with the formation of basic insoluble compounds, unless an excess of strong acid is present. The sulphate, being almost insoluble, and the nitrate, being unstable, cannot be used. This leaves, among the cheaper salts, only the chloride or the fluoride and no advantage seems to lie in the use of the more troublesome fluoride. A bath of stannic salts is reduced at the cathode by the current and a constant deposition of tin is not attained until a certain ratio of stannous to stannic salt is present, which ratio is theoretically the same as the ultimate composition of a bath made from stannous salts. Hence a solution of stannous chloride containing hydrochloric acid and perhaps such other salts as sodium chloride, ammonium chloride, etc., is the simplest and cheapest bath. Hydrofluoric, perchloric, fluoboric, and fluosilicic acids give soluble stannous salts, and they could be used for plating if they gave satisfactory deposits, although they are more expensive. An extensive study has already been made of baths containing many combinations of tin salts of the mineral acids, both with and without organic addition agents, but in no case was it found possible to obtain a solid, firm deposit that was free from coarse or rough crystals. The deposits were masses of bright glistening crystals which adhered fairly well in some cases. This class of baths is of no value where a solid, uniform deposit is desired, a fact that seems generally recognized, as is shown by the absence of baths of this kind among those recommended for plating purposes.

Tin salts readily dissolve in an excess of sodium hydroxide, forming a clear solution which remains free from precipitate and which would be satisfactory as the basis of a plating solution if such baths yielded firm, solid deposits. The voltage required by these baths is high, and the anode corrosion is low in many of them. A very large proportion of the tin baths which have been recommended for plating belong to this class, which may be further divided as follows:

Sodium stannite or potassium stannite may be used without the addition of other salts. The baths which were tried contained from 1.2 to 1.4 per cent of tin as stannous chloride and from "sufficient alkali for a clear solution" up to 6 per cent of potassium or sodium hydroxide. In all cases the deposits were masses of small, bright crystals which were worthless as a protective coating.

Deposits Unsatisfactory

Sodium or pottasium stannite and tartrates also were tried. The addition of tartrates to the alkali stannite baths did not improve the character of the deposit, which was spongy from the bath containing only 1.3 grams of fused stannous chloride per liter but crystalline from the bath containing three grams of the same salt per liter.

Sodium or potassium stannite and potassium cyanide, with or without other salts was employed, the various baths being as follows:

KCN	K_2CO_3 or Na_2CO_3	$SnCl_2$ (cryst)	KOH or NaOH	SnO_2	(cryst)	$Zn(C_4H_6O_2)_2$	$Na_2P_2O_7$
1	82.5	....	5.5	17.5	...		1
10	....	11	to	....	...		..
1	80	1.5	dissolve	....	...		..
10	110	2.5	...	....	...		..
111	....	1.2	7.5	....	111		..
35	....	7.5	111	....	...		..

None of these gave good deposits of any considerable thickness.

Plating Process too Slow

With large amounts of carbonate and little or no sodium hydroxide, the anodes dissolved so poorly that the tin in the bath was soon exhausted, after which both electrodes gassed vigorously. These baths gave good looking, bright deposits, which, however, were very thin. The current yields were very low, as was indicated by the quantity of gas evolved at the electrodes, it would require an extremely long time to obtain a deposit of any reasonable thickness from such a bath. Potassium cyanide seemed to be without much influence upon the crystalline structure of the cathode. Very large amounts of the potassium cyanide must be accompanied by correspondingly large amounts of sodium hydroxide, otherwise the tin is precipitated as a sludge in the bath and, upon electrolysis, little tin is deposited upon the cathode.

A bath containing 9 per cent potas-

Presented at the twenty-ninth general meeting of the American Electrochemical Society at Washington, April 27-29, 1916.

sium hydroxide, 0.35 per cent potassium cyanide, 0.75 per cent potassium bitartrate, and 0.75 stannous chloride is used commercially in barrel plating. The bath is run hot, 70 degrees Cent., and a thin deposit is obtained. At intervals, more of the potassium cyanide must be added. Experiments with this bath in a still solution indicated that thick deposits could not be obtained because of the formation of projecting crystals. However, very thin deposits appeared to be good, because the crystals were too small to be readily seen. Tumbling in a barrel would compact the deposit into a more firm and solid coating.

Sodium stannite and sodium thiosulphate were experimented with. The baths contained, in per cent, as follows:

$Na_2S_2O_3$	NaOH	$SnCl_2$	NaCl
7.5	12.5	5	...
6	12	3	...
1.5	9	3	1.5

The baths with 6 per cent or more of the sodium thiosulphate gave firm, finely-crystalline deposits, which became rough on continued electrolysis. A fine black precipitate was formed in the bath when the sodium thiosulphate was added. The deposits from these baths were the best obtained from any bath described by Kern. The deposits were dark but became bright and metallic after buffing. On continued electrolysis the deposits became rough and nodular, but projecting roughly adhering crystals were absent. Solutions at room temperature worked better than 60 degrees Cent. The current used for this test was 1.2 volts.

In the case of pyrophosphates, the Roessler bath, or modifications of it containing 1 to 3.7 per cent of sodium pyrophosphate and 0.1 to 2 per cent of fused stannous chloride, is highly recommended by various writers. The deposit from a hot solution is said to resemble silver. We are aware that this bath is used commercially, but nevertheless the deposits in our experiments were spongy and non-adherent. It seems that only thin deposits are produced, and that tumbling or scratch-brushing must be resorted to in order to give the deposits a bright, metallic appearance. Two of these baths, which are used commercially, contain:

Six parts of sodium pyrophosphate to one part of fused stannous chloride. It is said that the concentration can vary within rather wide limits without materially affecting the deposit.

Three per cent sodium pyrophosphate, 0.75 per cent fused stannous chloride and 0.2 per cent alum.

It is claimed that these baths may be run either hot or cold, but that only a low current must be used. It is recommended that a saturated solution of fused stannous chloride in sodium pyrophosphate be added at intervals to compensate for the poor anode corrosion. With stannous ammonium oxalate, a deposit consisting of long, needle-like crystals was obtained from a bath containing 2 to 3 per cent stannous chloride, 5.5 to 6.5 per cent ammonium oxalate and 0.3 to 0.4 per cent oxalic acid. The completed bath was heated to boiling before using. The addition of peptone to a modification of this bath containing more tin, prevented the formation of loose crystals and produced by far the smoothest, firmest and thickest deposits of tin which was obtained from any tin bath.

Using acid tartrate, a bath containing 6 per cent potassium hydrogen tartrate and 1.5 per cent stannous chloride gave a mass of small, loosely adherent crystals. After two weeks of continuous electrolysis, the crystals became much smaller and showed a tendency towards sponginess. The anodes dissolved unevenly.

The various dip or immersion solutions for tinning by contact without the use of outside current gave bright deposits of tin, thereby confirming all that is said of them in the literature and in the books upon plating.

Summary

The various baths for tin plating, which were described by Kern, were prepared and electrolyzed for two weeks with a current density of 3.6 amperes per square foot under the conditions recommended. In no case was a satisfactory deposit obtained, although the sponsors for the various formulas have made roseate claims for them. In most cases the deposits were masses of more or less adherent crystals, although in some cases they were spongy.

Among the baths described by Kern, the Beneker bath containing 25 grams of sodium hydroxide, 10 grams stannous chloride and 15 grams of sodium thiosulphate in 200 cubic centimeters of water, gave the smoothest, firmest deposits of good thickness. The deposits were dark in color but could be scratch-brushed to a bright, metallic appearance. The bath seemed to gradually deteriorate, the deposit becoming black and at last non-adherent. This bath is considered to be far below the quality desired for electroplating.

Some of the baths containing combinations of potassium cyanide and alkali carbonates or hydroxides with a little stannous chloride gave bright deposits, but there was a simultaneous liberation of hydrogen, and anode corrosion was poor. Such thin flashings hardly deserve the name of tin plates. The stannous ammonium oxalate bath containing peptone as an addition agent gave a smooth, firm, finely-crystalline deposit, the best obtained from any bath.

Measuring Viscosity of Oil

(*Concluded from page* 837.)

vice versa, by connecting each in turn with the partial vacuum chamber, *C*. These vessels were submerged in a thermostat which could be maintained at any desired temperature. The results, in terms of the viscosity of water at 20 degrees Cent. are given by a few of the points forming the curves 1 and 1a, Figs. 4 and 5, the latter referring to the lighter oil. The viscosity of these same oils as given by the new meter is represented on curves 1 and 1a by another series of points. The agreement between the two methods is almost perfect, the discrepancy not being apparent from the curves.

The viscosity of these oils as given by a meter of the short capillary type, Fig. 1, is given in curves 2 and 2a. Curves 3 and 3a give the viscosity of these oils as obtained with a meter of the orifice form. As predicted, the results given by the short capillary type are much too low (on the oils tested about 100 per cent too low) and the results given by the orifice type are still lower.

The errors inherent in all the flow types of viscosimeters have been predicted and the predictions verified by experiment. The magnitude of the errors are such that these meters cannot be depended on for giving even approximate results. The various meters of this type on the market do not give results which are in agreement, and no one of these meters can justly be claimed as a standard.

Conclusions

The improved viscosimeter of the non-flow type described has many advantages. It gives values for the viscosity which are in agreement with those given by the standard capillary tube method. The sensitiveness of the instrument can be made anything desired by changing the speed of rotation of the specimen or by using suspension wires of various diameters. Furthermore, the oil is not handled during a series of tests. The density or change in density is not a factor in computing the results, in fact the instrument may be graduated to read off the viscosity directly. The viscosity of liquids which contain particles in suspension can be measured, and the operation of the meter is independent of the color of the specimen. The temperature-viscosity curve can be taken with a fair degree of accuracy while the temperature is rising or falling, as the temperature of the specimen follows the temperature of the jacket so closely. The personal error which arises in determining time intervals with a stop watch is removed.

Safety Engineers Hold Huge Meeting

Fifth Annual Congress of the National Safety Council Convened in Detroit at a Record-Breaking Gathering—Many Lines of Industry Represented —Iron and Steel Sessions Are of Unusual Interest

"A THOUSAND years before Alexander the Great sat down and wept because there were no countries left for him to conquer, an Egyptian laborer, engaged in lime-washing the upper reaches of the sacred mausoleum which was being prepared for the infant prince of the second kingdom, fell from his scaffold and sustained severe injuries. For 3,674 years he has occupied a ward in the hospital of the world's work. Or, rather, all this would be true if all the time lost through industrial accidents, in one year, in one state, were credited to one man, and this does not include fatal cases. A high percentage of all accidents could be prevented with a little care and foresight." This is a statement by S. W. Tener, American Steel & Wire Co., and a member of the executive committee of the National Safety Council. In it is sounded the key-note that predominated in the papers and speeches delivered at the fifth annual safety congress, held at the Statler hotel, Detroit, Oct. 17-20. Without exception, the papers on accident prevention presented in the iron and steel sessions of the congress emphasized the point that education of the workingman is the predominate factor in reducing accidents.

The iron and steel business was but one of many lines of industry represented at the congress. Delegates from every iron and steel plant of any importance in the country were present and the iron and steel section, which held three meetings, was one of the most important on the program. The papers which were read touched upon problems of the greatest interest to the industry and the discussions which followed the reading of each paper, showed clearly that the safety-first movement is no longer a chimerical propoganda, but a serious, deeply rooted endeavor.

The congress opened formally, Tuesday, Oct. 17. The first day was devoted to registration of members, delegates and visitors and to the annual meeting of the members. It was announced on the last day of the congress that over 1,140 registrations had been filed. A general round table discussion was held on Tuesday afternoon, the topic for consideration being, "Maintaining Interest in Accident Prevention," led by H. W. Forster, chief engineer, Independence Inspection Bureau, Philadelphia. A special meeting was held in the evening to consider the adoption of a universal danger sign. This meeting was presided over by F. D. Patterson, chief, division of hygiene and engineering, Pennsylvania Department of Labor and Industry, Harrisburg, Pa. A special address, "Light and its Relation to Danger Signs," was delivered by Sydney W. Ashe, educational and welfare department, General Electric Co., Pittsfield, Mass.

Iron and Steel Papers Read

The first papers dealing with safety problems connected with the iron and steel industries were presented Wednesday morning. The meetings of this section were presided over by Chairman J. M. Woltz, safety director, Youngstown Sheet & Tube Co., Youngstown, O., assisted by George T. Fonda, vice chairman, safety engineer Bethlehem Steel Co., South Bethlehem, Pa., and Earl B. Morgan, secretary, safety engineer, Norton Co., Worcester, Mass.

Dr. Lucian W. Chaney, United States department of labor, Washington, delivered an address on "Progress of Safety in the Iron and Steel Industries." The principal points of Dr. Chaney's paper were forcefully brought out through the use of lantern slides. Dr. Chaney prefaced the reading of his paper by a few remarks on the progress of safety in the last 10 years. He said that the iron and steel industry is really the father of the safety movement and that the strides toward a safer industrial world have been marked to a greater degree in the metallurgical field than in any other. This progress, he added, is not only due to the fact that there was room for greater improvement in these two industries, but because in no other branch of industrial enterprise has money been spent so lavishly or so well on the education of employes and the installation of safe equipment.

The outstanding feature of Dr. Chaney's paper, as well as of those which followed, was the emphasis laid on education. The inability of some classes of labor to speak the English language, coupled with ignorance of safe practices, is largely responsible for the accident total. Foreigners who have a fundamental knowledge of English, rate just as high in freedom from accidents as native born laborers, and it is largely the non-English speaking man who is most frequently hurt.

F. H. Willcox, engineer, United States bureau of mines, Pittsburgh, read his paper on "Safety in Blast Furnace Operation." The substance of this paper is now being published in *The Iron Trade Review* in a series of articles by Mr. Willcox. The first installment appeared in the Oct. 19 issue.

One of the startling points in the address, "Safety in Bessemer Operations," by J. H. Ayres, superintendent of safety, sanitation and welfare, National Tube Co., National works, McKeesport, Pa., was the statement that in 1906 the percentage of men injured per thousand per year in steel plant operations was greater than the percentage per thousand per year of men killed and missing in the present great conflict abroad. "It is true," said Mr. Ayres, "that the scale upon which these calculations are based, is different, but the fact remains, that the number of men seriously injured reached a tremendous figure in our industrial life. Fortunately, that condition no longer exists. The strides which have been made are beyond comprehension, and if it were not for the figures which have been compiled, they would be beyond belief. We may well point with pride to the table of statistics which shows that the iron and steel industries are no longer taking such a ghastly toll of human life."

J. M. Woltz, in making a few remarks at the close of this paper, stated emphatically that "the clarion call of education has been heard. We should feel, all of us, that on our efforts the health, happiness, and safety of life and limb of our men depend. Yet we cannot feel that our work has been done well if we neglect to teach these men the rudiments of self preservation. Our hope for greater safety seems to lie in greater education."

"The immensity of open-hearth production," said James Thorpe, superintendent of open-hearth furnaces, Illinois Steel Co., Gary, Ind., in a paper on "Safety in Open-Hearth Operations," "makes for a high percentage of accidents." It was pointed out that the work involved is not more hazardous, but that its very size is responsible for its standing high in accident rate where the various departments of the steel plant are averaged separately. "In the open-hearth department," said Mr. Thorpe, "we not only have to contend with the open-hearth furnaces alone as sources of accidents, but there are the problems of transportation, storage of hot metal and the complex variety of machinery necessary for the operation

of open-hearth furnaces." Mr. Thorpe was particularly emphatic in his remarks on the selection and education of the men in the open-hearth department and in his denunciation of the bonus system of rewards for safety observance. On the last point he said that as a matter of self preservation the men should be glad to observe the rules laid down for them; that they should be willing to make use of appliances that had been installed for their benefit. "The high temperature," said Mr. Thorpe," found in the open-hearth department makes this work difficult for some men. A rigid physical and mental examination should be made of every man about to be employed in open-hearth work."

This paper was followed by a discussion by Walter Greenwood, safety inspector, Carnegie Steel Co., Youngstown, O. Mr. Greenwood elaborated on the paper and made a number of pertinent suggestions on plant construction. Education again was brought to the fore and the necessity of having orders understood as well as promptly obeyed was emphasized. "Indifference to danger, fool-hardy stunts for the benefit of the more timid new men, horse-play and teasing should not be tolerated," said Mr. Greenwood.

A buffet luncheon and smoker at the Tuller hotel, at six o'clock in the evening, concluded the proceedings on Wednesday.

The Thursday session was opened by the reading of a paper by Dr. F. L. Hoffman, statistician, Prudential Life Insurance Co., Newark, N. J. "Achievements and Possibilities of Accident Prevention in American Industries" provided a theme upon which Dr. Hoffman was well qualified to dwell at length. "The fallacy so often indulged in," said Dr. Hoffman, "is the comparison of two unlike things. We cannot compare the percentage of accident reduction in one plant against the percentage of reduction of another plant and have a fair answer. The conditions of both plants are not identical. The human elements cannot be the same and it is upon the human element that our figures depend. The real gain or loss in accident reduction must, therefore, be based upon the individual case." One remarkable feature of Dr. Hoffman's paper was a table of statistics showing the decrease in fatal accidents.

A paper on "Employment" by A. H. Young, superintendent of labor and safety, Illinois Steel Co., South Chicago, Ill., brought out many interesting phases of the safety work as practised at that plant.

Mr. Young said in part:

"The development of the modern employment office, and the portrayal of its present functions, is not less interesting than, and fully as worth while as, the growth of the much more popular and better advertised "Safety First." In fact there is a similarity in the contemporaneous growth of the two movements, which, coupled with the health service, profit-sharing and other fellowship activities of present day industrialism, must convince even a pessimist that the day of the universal brotherhood of man may ultimately be realized in America.

"The employment bureau of today has responsibilities far outweighing the mere supplying of labor and maintenance of service records. When properly functioning it will provide an employe peculiarly fitted for each of the varying occupations served; it will discover the worker not fitted to his task, and, having done so, will find the task suited to the worker. Not only must job and man harmonize, but also must it be assured that there will be no discord where many men are fitted to a single task. Thus, Turk, Surb, Greek, Croat, Dalmation, Montenegran, Russian or Pole, may each be found desirable as laborers in a blast furnace plant. It is a wise employment agent who will not try to blend them all into one gang, lest the accident rate rise. You can't keep red ants in a black ant hill."

The efficacy of the safety engineer or of the safety department, it was stated, depends to a large degree on the employment agent. The men in the plant must be willing to obey orders, and capable of understanding them if the purposes of the safety department are to be realized.

Co-operation Between Men and Company

In the absence of J. M. Larkin, secretary of the safety committee, Fore River Ship Building Co., Quincy, Mass., who was scheduled for a discussion of Mr. Young's paper, E. H. Fish, Norton Co., Worcester, Mass., made a few extemporaneous remarks. Mr. Fish stated that the welfare work done in many plants creates the feeling among the men that the company is with them; that the employer is not, as some yellow journals insist, a 'bloodless corporation, without heart or soul,' but a concern with the well-being of each individual at heart. He said that today, owing to the peculiar labor conditions which exist, every great industrial organization is after all a great educational institution, showing the men how to do their work, why to do it one way and not another and teaching them to become trained experts in one line.

At the close of this discussion the report of the nominating committee for the iron and steel section was read. George T. Fonda, Bethlehem Steel Co., South Bethlehem, Pa., was elected chairman; Earl B. Morgan, Norton Co., Worcester, Mass., was elected vice chairman, and A. H. Young, Illinois Steel Co., South Chicago, Ill., was elected secretary. A short address of welcome and good wishes was given by the retiring chairman, J. M. Woltz, and the new officers took charge of the meeting.

"The Origin of Safety Methods and Prevention of Infection," by Dr. C. C. Booth, chief surgeon, Bethlehem Steel Co., South Bethlehem, Pa., was next presented. Dr. Booth was particularly emphatic in his remarks regarding the prevention of infection by maintaining sanitary conditions about the plant. He urged that the smallest of cuts be given attention in order to arrest the progress of infection.

"The Duties of the Visiting Nurse," by Miss Florence Wright, Clark Thread Co., Newark, N. J., brought out some interesting phases of the work which can be done by a nurse either regularly employed by the company or by a nurse visiting an industrial plant once or twice a week.

The banquet, which was held at the Statler hotel, Thursday evening, was attended by about 350 guests. Arthur T. Morey, Commonwealth Steel Co., Granite City, Ill., acted as toastmaster and spoke at length on the progress which had been made during the past year. R. C. Richards, chairman of the central safety committee, Chicago & Northwestern railroad, Chicago, was elected an honorary member of the National Safety Council. The executive committee which was appointed Wednesday was composed of the following: Maj. R. U. Patterson, Dr. F. L. Hoffman, G. O. Smith, George T. Fonda, F. H. Wentworth, M. A. Dow, H. W. Forster, L. R. Palmer, E. R. Pritchett, C. B. Scott, S. F. Shattuck, S. W. Tener, E. G. Trimble, David VanSchaak, A. W. Whitney, R. J. Young, L. M. Eaton and C. N. Talbert.

Mr. Morey, at the banquet, announced that the officers for the ensuing year are as follows: President, L. R. Palmer, Pennsylvania department of labor and industry; first vice president, David VanSchaak, Aetna Life Insurance Co., Hartford, Conn.; second vice president, H. W. Forster, chief engineer, Independence Inspection Bureau, Philadelphia; third vice president and director of exhibits, M. A. Dow, general safety agent, New York Central railroad, New York City; general manager and treasurer, W. H. Cameron, Chicago; assistant secretary, J. J. Lamont, Chicago.

"Safety in Rolling Mill Operations," presented at the Friday session by Charles R. Hook, general superintendent, American Rolling Mill Co., Middletown, O., brought out a number of interesting points. Mr. Hook stated that in his opinion there are three factors dominating that decide the extent to which the safety movement is suc-

cessful in every establishment. These three factors are: *First*, the company policy; *second*, the attitude of superintendents and foremen, and *third*, the attitude of the workmen. Mr. Hook said in part:

"It has been often and well said that the best safety device is a careful man. The biggest and the most important problem, therefore, is the building up of an organization of careful men. Company policy can very largely influence the attitude of superintendents and foremen and the attitude of the workmen. While practically all companies have been most liberal in their expenditures for safety devices and safety organization, many, I think, have failed to realize the real scope of the safety movement, and have overlooked some of the influences which tend to make safe men. The success of the safety first movement depends so largely on the conditions of the home of the workman that it must be the policy of the company to interest itself in every problem, the solution of which operates for a sound body, a clear eye and brain, and a clean standard of morals.

"There must be a realization of individual responsibility, and this can only be general when moral standards are high. The company should interest itself in all the civic movements for better sanitation, better streets and better homes. It should encourage the planting of flowers, the developing of beautiful lawns, and the cultivating of vegetable gardens. Will any one doubt that the man who spends his spare time among flowers, developing a lawn or cultivating vegetables, is a *better citizen and a safer workman* than he who spends his spare time in idleness or at the corner saloon?

"The great improvement in housing conditions and the determined stand in favor of sobriety, taken by many iron and steel manufacturers and other large industrial institutions, portends much for the future; it means happier families and safer workmen."

"It has been heard on many sides," continued Mr. Hook, "that this safety first movement would cut down production and increase costs. It has not been found in any case, and there have been thousands of cases investigated by men competent to judge such things, that production has been cut down or costs increased. As a matter of fact, tonnage and costs are directly dependent upon the attitude of the men employed, to the safety movement. You cannot expect to have a harmonious smoothly working system, if some one workman insists upon throwing a wrench into the cogs by insubordination and bull headedness. Conscientious effort on the part of the men, a well trained and efficient safety engineering staff will make for greater tonnage reports and reduced costs."

P. R. Baker, assistant general superintendent, Lukens Iron & Steel Co., Coatesville, Pa., in discussing Mr. Hook's paper, brought out the fact that it is the old men that are hard to convince of the necessity of doing things safely. "They have gone so long, some of them," said Mr. Baker, "without safety devices, without training in safety practices, that they feel that the movement is a joke. They will not cooperate with you readily, but once you have convinced them that it is the safe men that you will advance, that it is the careful man that stands in line for better positions, then they will see that you are in earnest, and you will find,

L. R. PALMER,
President of the National Safety Council

then, that it is the old men who are the most enthusiastic boosters and best of all, the most practical every day disciples of safety first."

D. M. Petty, superintendent of the electrical department, Bethlehem Steel Co., South Bethlehem, Pa., in a paper on "Electric Hazards," made a strong point in his address to the effect that "familiarity breeds contempt" and contempt around a high voltage machine is a thing to be eliminated. "It is a wrong practice," said Mr. Petty, "to load a low voltage machine with a multiplicity of "Keep Off," "Danger," "Hands Off," and skull and cross bones signs. The men know that a shock from a low voltage machine, under 300 volts, will not, 99 cases out of 100, have any serious results. They realize that and they feel a contempt for the signs that you may feel inclined to put on that machine. Isn't it natural, then, especially if the man is not an electrician, to be equally contemptuous of the high voltage machine, if it is loaded down with signs?" Mr. Petty urged that particular care be used in the repair of all type of electrical apparatus and suggested that if repairs are to be made, less time and money will be spent and a smaller likelihood of serious accident will be encountered, if the repair work is done by an experienced electrician.

"Safety in Coke Oven Operation," by K. M. Burr, safety inspector, Illinois Steel Co., Gary, Ind., brought out a number of phases of this work which are particularly interesting. The lively discussion which followed the reading of this paper showed conclusively that the subject is of unusual interest to operators of coke-oven plants. The unprecedented demand for coke by-products has created unusual conditions in the operation of ovens of this type and Mr. Burr's paper was enthusiastically received.

"Police and Fire" was the subject of a paper delivered by G. W. Atwood, Youngstown Sheet & Tube Co., Youngstown, O. The work which is done at the plant of the Youngstown company was described in detail and the plans which are now being worked out by this company for even greater insurance against fire were commented upon.

Amid the complex activities of the fifth annual safety congress, the interests of the foundry business were prominent. Approximately 200 representatives of American casting plants participated in a special meeting on foundry safety held Wednesday morning, Oct. 18. The papers were interesting and the discussions brought out many points of practical value. The meeting was presided over by O. J. Fehling, manager, National Malleable Casting Co., Chicago, chairman of the foundry section.

Following the routine reports of the officers and standing committees, S. W. Ashe, educational and welfare department, General Electric Co., Pittsfield, Mass., presented a paper on "Strains, Sprains and Burns." In the ensuing discussion, one of the speakers asked if men afflicted with hernia, or rupture, are accepted by the General Electric Co. Mr. Ashe replied that in normal times it is the policy of the company to avoid hiring such men, including those with a tendency toward hernia. Of course, in prosperous times like the present, he explained, such rules can be too strictly enforced. If a man with hernia tendencies is hired now, owing to labor stringency, he is required to sign a release which, although it has no legal standing, reduces the number of spurious claims for compensation.

In response to a question relating to safety clothing, Mr. Ashe stated that the General Electric Co. has abandoned

the practice of selling such articles direct to its employes, preferring to work through the local dealer. In the case of congress shoes, for instance, a stock of approved styles is carried by a local merchant and the men are given tickets by the company which the storekeeper accepts as 20 per cent of the retail price of the shoe. In other words, the company's employes obtain a 20 per cent discount.

"Crane and Chain Practices" was the title of a paper presented by F. H. Elam, manager, casualty department, American Steel Foundries, Chicago. Mr. Elam pointed out that every part of a crane must be safeguarded and that the trolley is a specially prolific source of accidents. He recommended a physical examination for cranemen. Annealing chain slings, he said, does not correct faults unless the chain has been overheated, which rarely occurs in foundry practice.

A representative of the American Locomotive Co. recommended the substitution of wire cables for chains, but Mr. Elam pointed out that the cables now available are unsatisfactory for slings owing to their tendency to twist, possibly releasing the hook at a critical moment.

In a discussion on limit switches it was brought out that these devices should be designed so they cannot be reset easily, in order to discourage operators from relying on them in making service stops. The limit switch manufactured by the Pawling & Harnischfeger Co., Milwaukee, was described by L. B. Gates, Allis Chalmers Mfg. Co., West Allis, Wis. A motion was passed instructing the secretary to send out a questionaire on limit-switch designs and crane brakes, the results to be published in one of the bulletins issued periodically by the foundry section.

Saving Eyes

F. W. Shepard, safety inspector, American Cast Iron Pipe Co., Birmingham, Ala., introduced his paper on "Eye Protection" in an original manner by first appearing with the thick, smoked glasses and cane of the blind man. The unusual danger of infection resulting from eye accidents was emphasized by Mr. Shepard. He also took up the question of abnormal or defective vision, which he said, is more prevalent than most people realize and is one of the greatest causes of industrial accidents.

In the discussion of Mr. Shepard's paper, L. D. Burlingame, superintendent, Brown & Sharpe Mfg. Co., Providence, R. I., stated that most of the objection to goggles comes from men who wear ordinary spectacles and do not like double glasses. "We have eased off on the goggle requirements in such cases," he said, "and are watching the results." Although Mr. Burlingame suggested that specially ground corrective lenses are too expensive for shop goggles, other speakers, including Mr. Shepard, contended that this is the only solution of the problem of protecting the eyes of workmen with abnormal vision.

Back With the Saloon

Two papers, "Alcohol vs. Safety," by Dr. H. P. Hourigan, Larkin Co., Buffalo, and "Foundry Sanitation," by J. F. Alexander, secretary, Metal Trades Safety Association, Toronto, Ont., were discussed together. Dr. Hourigan's paper constituted a powerful argument against the liquor tariff, based purely on records of industrial accidents. Mr. Alexander's paper points out the essential elements of foundry sanitation, the greatest of which, he said, is ventilation.

The question of alcoholism came in for considerable discussion. R. G. Williams, safety engineer, Norton Co., Worcester, Mass., told of the success achieved by the establishment of milk stations in the Norton plant. At present, he said, 100 gallons of buttermilk and 100 gallons of sweet milk are being distributed daily. Other speakers pointed out that it is absolutely essential to provide a substitute for the corner saloon, in the shape of lunch rooms, club rooms, etc., if intemperance is to be fought successfully. A tribute was paid to the great pioneer work of the late Thomas D. West in starting the industrial propaganda against liquor. Mr. West's paper on this subject read before the American Foundrymen's Association in 1914, was referred to as a classic.

The first national exhibit of safety appliances was held at the Detroit armory, in connection with the meetings of the congress. The exhibition was under the direction of C. E. Hoyt, Lewis Institute, Chicago. Fifty-six exhibitors participated in the show. In addition to modern safety devices, several companies displayed photographs, charts, lantern slides and moving pictures showing methods of promoting safety and preventing accidents. A complete list of the exhibits follows:

AETNA LIFE INSURANCE CO., Hartford, Conn.—Accident prevention pictures, charts, devices, etc., all relating to safety and Aetna Life Insurance Co.

ALLEN MFG. CO., Hartford, Conn.—Set screws.

AMERICAN ABRASIVE METALS CO., Detroit.—Anti-slip floor plates, stair treads. Examples of well-constructed stairs with safety treads; example of poorly constructed stairs with badly worn and dangerous treads.

AMERICAN LIGHTING CO., Chicago. — Davis system of safety first industrial flood lighting.

AMERICAN MUSEUM OF SAFETY, New York City.

BALTIMORE & OHIO RAILROAD, Baltimore.—Historical exhibit of railroad transportation, including models of B. & O. horse-drawn car of 1829-30. "Grasshopper" engine which was built in 1832 and carried the first passenger train into Washington. Reproductions of safety suggestions to passengers and other material used in safety campaigns.

CHICAGO EYESHIELD CO., Chicago, Ill. —Safety goggles and eye protectors.

COMMONWEALTH STEEL CO., Granite City, Ill.—Safety devices.

DETROIT FUSE & MFG. CO., Detroit.—Enclosed safety switches.

DETROIT LOCAL SAFETY COUNCIL, Detroit.—Pictures of welfare work in Detroit automobile plants.

DETROIT BOARD OF COMMERCE, Detroit.—Pictures of welfare and accident prevention work in and about Detroit.

DEVILBISS MFG. CO., Toledo, O.—Systems of painting and varnishing.

DRAEGER OXYGEN APPARATUS CO., Pittsburgh.—Oxygen helmets, pulmotors, safety first signs, etc.

FORD MOTOR CO., Detroit.—Model of Detroit plant.

THE FYR-FYTER CO., Dayton, O.—Fire extinguishers and appliances.

HERBERT GARNETT, Toledo, O.—Smoke, ammonia, gas and chemical filter. Respirators for every service.

F. A. HARDY & CO., Chicago. — Safety glasses and eye protectors. Respirators and helmets.

KIMBERLY-CLARK CO., Neenah, Wis. — Safety work in the paper and pulp industry.

JULIUS KING OPTICAL CO., New York City.—Safety goggles, helmets, masks, etc.

KRANTZ MFG. CO., Brooklyn, N. Y.—An exhibit of safety auto-lock switches, motor starters, safety power centers, safety panel boards and safety switch boards.

LIFE SAVING DEVICES CO., Chicago.—Lungmotors.

LINEMEN PROTECTOR CO., Detroit. — Linemen's shields and cross-arm protectors.

THE MADDEN CO., Chicago.—Richter blue flag derailer fitted to section of 80-pound American Society of Civil Engineers rail.

MICHIGAN WORKMEN'S COMPENSATION MUTUAL INSURANCE CO., Detroit. —X-Ray transparencies showing serious fractures and other industrial injuries; photographs of the Manufacturers' Mutual hospital, owned and operated by this company.

MINE SAFETY APPLIANCES CO., Pittsburgh.—Safety appliances for mining and industrial plants, including safety and prevention signs, lungmotors, first aid supplies, approved stretcher outfits, shot firing batteries and lamp testing boxes.

MULTI-METAL SEPARATING SCREEN CO., New York City.—Sandblast helmets, dust hoods, babbitting masks, respirators, gas helmets, etc.

NATIONAL SAFETY COUNCIL, Chicago. —Special educational exhibit.

NEW JERSEY ZINC CO. OF PENNSYLVANIA, Palmerton, Pa.—Various safety devices and means of protecting workmen, starting with the mining of the ore and ending with the finished product.

NEW YORK CENTRAL LINES, New York City.—Educational safety exhibit, showing work carried on by the safety bureau of the New York Central Lines.

NORFOLK & WESTERN RAILWAY, Roanoke, Va.—Exhibit showing what has been accomplished in the reduction of accidents, and how and by what appliances it has been accomplished.

NORTON CO., Worcester, Mass. — Floor grinding wheel stand with protection hook, also transparencies illuminated by electric lights from rear. Bench grinding wheel stands.

OLIVER MACHINERY CO., Grand Rapids, Mich.—Circular safety cylinder for jointers and surfacers, circular saw guards, swing saw guards, and automatic jointer guards.

OTIS ELEVATOR CO., New York.—Model

Woolworth tower and elevator safety devices.

PATHESCOPE SALES CO., Detroit.—The pathescope in operation.

PURO SANITARY DRINKING FOUNTAIN CO., Haydenville, Mass.—Bubbling sanitary drinking fountains.

PYRENE MFG. CO., Detroit.—Fire extinguishers and appliances.

RESPIRATORY APPARATUS CO., Chicago.—The life motor, an instrument for producing artificial respiration in all cases of asphyxia.

JOSEPH T. RYERSON & SON, Chicago.—Interesting models of safe stairs and inclines, using Mason safety treads. Safety views of causes of stair accidents, posed and electrically illuminated.

SAFETY FIRST SUPPLY CO., Pittsburgh.—Safety first appliances and first aid equipment.

SAFETY AND EFFICIENCY BUREAU, Columbus, O.—Charts, models, posters and microscopic specimens showing the relation of the use of alcoholic liquors to accidents and efficiency.

SCOTT PAPER CO., Philadelphia.—Towels, toilet paper and other products.

R. P. SMITH & SONS CO., Chicago.—Safety congress shoes for molders and foundrymen.

STRONG, KENNARD & NUTT CO., Cleveland.—Adjustable goggles.

SURETY GUARD CO., Chicago.—Guards for machinery and elevators.

THOMPSON ELECTRIC CO., Cleveland.—Automatic safety cut-out hangers for arc lamps.

U. S. BUREAU OF MINES, Washington.—Safety work carried on by the government in the mining industry.

WALSH PRESS & DIE CO., Chicago.—Punch press guards.

WHEELER & HOLCOMB, Chicago.—Asbestos gloves, mittens, coats, pants, aprons. Steel grip gloves and mittens. Safety leggings in duck, leather and asbestos.

WINDOW CLEANERS' IMPROVED BELT & DEVICE CO., Chicago.—Safety devices for window cleaners.

Great Mines Are Exhausted

But New Ones Will Take Their Place—Interesting Changes in Mesabi Mining Operations

The present season will see the exhaustion of several great mines on the Mesabi range. Among those which might be mentioned is the Alpena, at Virginia, which for years has been a large shipper from its open pit and at which operations are now confined to the underground mining which usually is necessary to exhaust the ore deposit from any property. The Norman mine of the Oliver Iron Mining Co., also located at Virginia, is near its point of exhaustion. This is the deepest pit on the entire range and operations have been light for some months. The Shenango mine of the Shenango Furnace Co., at Chisholm, is also another property at which shipments from the pit with locomotives and steam shovels will probably cease within the next year or so. This is a very deep pit and has been one of the largest producers on the Mesabi. The Hanna A mine of the M. A. Hanna interests located at Mountain Iron, a state lease, will also ship its last next year, and the Genoa, another property located at Sparta, is an example of a mine opened and practically exhausted within a few years. One might say with considerable safety that there are no less than one dozen open pit properties on the range which the present season will see closed of activities.

However, the iron and steel industry does not need to worry about its ore supply on the Mesabi for years to come. While properties have been exhausted, new ones have taken their places and, strange to say, the new ones have been and will be as great as those which are now passing into history. Among these might be mentioned the great Hull-Rust pit with a vast reserve of ore and from which a new record for the United States will be set this season. Near Hibbing there is also the Susquehanna pit at which the present shipping season is the first. At Chisholm the Great Northern iron ore properties developed the Dunwoody pit last season and hardly a shovel full of ore has been removed from this great deposit. The Great Northern iron ore properties have also developed the Smith at Hibbing, from which little or no ore has been shipped. At Keewatin the Bennett pit shipped its first ore this season and at Nashwauk the Mace No. 2, the Harrison and the Kevin are all new properties. Two great state leases are also to join the ranks of shippers. A. Guthrie & Co. are stripping the Hill Annex at Calumet, Minn. They are removing to uncover this ore 8,500,000 cubic yards of dirt, probably the largest single contract in the history of the range, and this is to uncover millions of tons of high grade ore.

On the Mesabi Mountain, another state lease, owned by the Oliver company at Virginia, 12 drills have been at work determining information relative to development operations. This property is the largest of all state leases and must be operated with the removal of a large tonnage before the lease expires.

And so one might name a long list of practically exhausted properties and a long list of new mines ready to ship even greater tonnages than the Mesabi range has ever before shipped. While the Oliver Iron Mining Co. is exhausting the Hill pit at Marble, Minn., in its Canisteo district, it is also developing the Arcturus, 2 miles away. The Mesabi range is in a state of preparedness and while the present season's activity will doubtless see the exhaustion of available tonnages in certain properties, next season will nevertheless find large open pits already developed to meet even greater demands of the iron and steel industry.

Builds Service Station.—The Hudson-Stuyvesant Motor Co., which recently erected a sales office at 2010 Euclid avenue, Cleveland, is now at work on another structure, a service station, to be located at 1937 Euclid avenue. The new building will be five stories and will contain 65,000 square feet of floor space. It will be devoted chiefly to car service, repairs and the sale of used cars. The second floor will be used for storage. The building will be constructed of reinforced concrete and brick, rendering it fireproof. Skeel Bros., architects for the new structure, have been awarded the contract.

New Welding Company.—The Guardian Gas Appliance Co., Cleveland, was recently incorporated for $25,000. The officers are Robert Bursner, president, George E. Meier, treasurer, W. M. Mortimer, secretary, and A. R. McRitchie, general manager. The company will weld automobile engines and cylinders. The factory building, 60 x 120 feet, has already been erected at 2707 East Ninety-first street. Welding machines, heating furnaces, and blower engines have already been installed. It is expected that the plant will open before the end of the month.

New Cadillac Station.—The Cleveland Cadillac Co. will erect a service station at the intersection of Chester avenue and East Thirtieth street, Cleveland, the cost of which will be approxiamtely $100,000. This new building, a two-story reinforced concrete structure, will be 130 x 254 feet. Wm. S. Lougee, Cleveland, drew up the plans and the Crowell-Lundoff-Little Co. has been awarded the contract for construction.

Water Purification.—The American Steel & Wire Co. has issued a manual of its process of water purification with sulphate of iron. A large amount of information on water purification is given which will be of interest to municipal officials and others connected with water works systems.

Business News of Nation's Capital

War Department Plans for Manufacture of Special Appliances—Step Toward Military Preparedness—Bids on Battleships and Destroyers

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
Oct. 24, 1916.

PLANS are being taken up by the war department for the manufacture or purchase of gages, dies, jigs, tools, fixtures and such other special aids and appliances, including specifications and detailed drawings, as may be necessary for the immediate manufacture, by the government and by private manufacturers, of arms, ammunition and special equipment that will be required by the army in time of war. Legislation providing for these special appliances and drawings was carried in the national defense, fortifications and army appropriation acts of the last session of congress. Awards having been made recently and about to be made by the war department for ammunition and arms, the war department is preparing to have private plants supplied with the necessary special appliances and drawings, so that they can be kept on hand for the quick production of arms and ammunition in the future in case of war or impending war. It is probable that some of the private plants will produce their own special appliances in accordance with war department specifications, while others will be supplied with them by their manufacture at the arsenals. Fixtures for the production of ammunition perhaps will be manufactured first, inasmuch as 50,000,000 rounds of ammunition are to be awarded soon, with contracts for arms to be made later.

It is understood the war department has taken up the matter of providing the private munition makers with these special fixtures by asking them whether they can produce them at their plants or whether it will be necessary for the arsenals to furnish them. The fact that the arsenals are being rushed with work has apparently made it desirable that the private plants do all they can in the way of equipping themselves with the necessary special fixtures. The present extensive military preparedness program has made it necessary for the government to rely much more than it has in the past on private resources for its requirements.

The legislation to this end is not what it might be, and, although conflicting and restricting in some respects, it is a long step toward military preparedness.

Law as to Competition

The national defense act, approved June 3, last, which provides for the procurement of these special fixtures, also carried a provision that the then existing laws prescribing competition in the procurement of supplies by purchase shall not govern whenever in the opinion of the secretary of war such action will be for the best interest of the public service. The object of the legislation is apparent. Those who have paid any attention to the matter know the length of time which it required for fitting concerns already in operation with special tools, etc., necessary to produce large quantities of such articles as small arms, cartridges, or fuses, for field artillery ammunition, etc. It has been estimated that a plant well equipped for the manufacture of a military rifle of a given model would require something like eight or nine months to supply itself with these special fixtures for use with its already installed machinery, in sufficient quantity to enable it to turn out a rifle of a different model in some such reasonable number as 1,000 a day, as has been said by Brig. Gen. William Crozier, chief of the bureau of ordnance, war department. It therefore is readily seen that there is incalculable value in advance preparation in the matter of these special appliances. Further advantage is given the government in the proviso that orders may be placed without regard to the matter of competition.

The fortifications act appropriates $1,000,000 for the purchase of these special appliances, to be installed in private plants. It is provided, however, that not exceeding 25 per cent of this sum may be used in obtaining from plants so equipped such material as may be desired. There is also a further provision that not exceeding $50,000 worth of such material may be purchased from any one person or company. There is restrictive legislation in this act, for it carries the following provision:

"That except as expressly otherwise authorized herein no part of the sums appropriated by this act shall be expended in the purchase from private manufacturers of any material at a price in excess of 25 per centum more than the cost of manufacturing such material by the government, or, where such material is not or has not been manufactured by the government, at a price in excess of 25 per centum more than the estimated cost of manufacture by the government: Provided, however, That whenever, in the opinion of the President, an emergency exists affecting the general welfare of the United States, he may waive the limitations contained in this section."

There is also a provision that expenditure shall not be made in such manner as to prevent the operation of the government arsenals at their most economical rate of production, except when a special exigency requires the operation of a portion of an arsenal's equipment at a different rate.

Commenting on this legislation, Gen. Crozier has said:

"The ordnance department has taken some pride, and believes it has met with some success, in cheapening the cost of government manufacture. If its own estimate of its success has not been overdrawn, it may not be easy to find private manufacturers willing to accept as small an order as might be permitted under the limitation cited above, if their prices shall be limited to 25 per cent in excess of the price of the government. And there is some possibility that acceptance in such cases may have to be induced by appealing to the patriotism of the manufacturer in cooperating with the government, without profit, in preparing himself to meet the government's needs in time of emergency. The requirement for operating the government arsenals at their most economical rate before giving orders to private manufacturers probably will call for their operation at double shift; we will therefore be limited in the orders which we can give for keeping private manufacturers in the knowledge of the methods of making war material which comes only from practice, to the extent of the excess of the sums appropriated over and above the amounts which will be necessary to keep the arsenals going at double shift. I am glad to state that the appropriations have been sufficiently generous to provide this excess in most cases; but the extent to which private establishments can

be employed in the manufacture of war material, to the advantage of the government, will be less than it would have been if we had been authorized to operate the arsenals at a single shift only, which is the rate which, in my testimony before committees of congress, I have advocated as being of most advantage to the government."

It has also been pointed out that the army appropriation act of Aug. 29, 1916, provides $10,000,000, principally for small arms ammunition, which is accompanied by the proviso that not more than $5,000,000 of this amount may be used in the purchase of ammunition. Authority for making purchases is, therefore, sufficient to considerably encourage private manufacturers, and, in addition, it is provided that $250,000 of the appropriation may be used in equipping private plants with special tools, etc., and that $50,000 worth of orders may be given to individual private makers, in furtherance of their preparation to meet the government's emergency needs, by war department selection, instead of by competition. Most of the items for appropriations for munitions, in the army appropriation act, it has been shown, are accompanied by similar restrictions, and in some instances they are likely to be less encouraging than those just mentioned, to the preparation for utilizing the national resources.

Previous provisions have been much more restrictive, however. For instance, the fortifications act of March 3, 1915, provided that of the sums available "not more than 10 per centum may be used to purchase not to exceed 10 per centum in quantity of value of any article or material herein appropriated for that can be manufactured at the arsenals of the ordance department, except when contract costs are less than the arsenal manufacturing cost."

Bids on Battleships

Washington, Oct. 24.—Bids will be opened tomorrow by the bureau of construction and repair, navy department, for four battleships and 20 destroyers, representing a portion of the requirements of the new naval act. It was originally intended to open bids at the same time for a number of other vessels, but the dates for this purpose have been postponed. Private yards will do virtually all of the construction of the naval ships, and it is understood that most, if not all, of the big ship building companies will submit bids which are to be opened tomorrow. The government yards are already crowded with work, as are the private yards, but the former apparently are unable to take on any additional work of an extensive character with a prospect for adequate delivery of vessels.

On Nov. 1, the bureau of ordnance, navy department, will open bids for 45.583 tons of armor plate required for four battleships and four battle cruisers. Because of the large tonnage involved, it has been reported that armor manufacturers may be able to submit lower figures than they have in the past, when annual requirements ranged from 8,000 to 16,000 tons. The price at which armor for battleships was awarded last year was $425 per ton. While nothing is known as to what the bids may be on the large tonnage of this year, it has been thought probably they may range from $400 to $410 per ton for side armor.

Orders for more than 200 aeroplanes have been placed by the war department as the first step in the expansion of the aviation service under the army reorganization act. Contracts for 100 additional machines of various tyes probably will be awarded in the near future. In most cases, delivery of machines ordered is to be made within 147 days. The act appropriates $13,000,000 for the aviation service.

Chandler Motor Co. Additions

Owing to the heavy demand for automobiles at the present time, many automobile owners are making extensive additions to their plants. The Chandler Motor Co., Cleveland, is engaged in erecting several buildings which will more than double the size of the plant, and, it is expected, will about double the output of automobiles.

The largest of the new structures, a four-story 60 x 500-foot building, has been under construction for almost a month. This building will be used for storing bodies, enameled parts, tires and rims. Final inspection of cars and equipment will be made on the main floor. A new tool room will also be installed. The structure will be made of reinforced concrete, the contract calling for its completion by Jan. 15, 1917. Three stories will be added to a 60 x 160-foot service station, which now has but one story. This building will contain the service offices, service parts shipping department, stock room and repair shop. A trained nurse and company physician will also make their headquarters in this building.

The Chandler company has also purchased a lot across the street from its present location, where in a short time another new factory building will be erected, to be used in handling export business.

Coke By-Products

Cancellation Clause Contingent Upon War Ending.

New York, Oct. 24. — Heavy phenol buying was the outstanding feature of the coke-oven by-product market during the past week with sales estimated not less than 1,500,000 pounds. Manufacturers of picric acid placed large contracts for delivery over the next six to 12 months. There has been incorporated in these contracts a special cancellation clause contingent upon the ending of the war providing that revoking of unfilled portions will be acceptable to sellers 30 days after the signing of an armistice by the belligerent powers. The drug trade has been buying considerable phenol. The market now has been well cleaned out of supply either for spot or for future delivery over the next several months and only comparatively small lots are obtainable. Prices are strong at from 55 to 60 cents, per pound, with the accent upon the higher figure.

Benzol has continued active, especially on spot. Quotations range from 60 to 65 cents, per gallon, and on quantities such as 50,000 gallons or so, the inside figure can be shaded. Future contracting is quiet, but sellers look for this to begin vigorously in December and January, when many present orders expire. The outlook for the market has improved considerably. Toluol is quiet, with a better undertone. Prices vary considerable and are affected by the use to which the product is to be put. War requirements are quoted higher than for purely domestic needs. Spot toluol is quoted from $2.50 to $3, per gallon, and contract from $2.25 to $2.50, per gallon. Solvent naptha is in better inquiry but weak at from 25 to 30 cents, per gallon.

Sellers of sulphate of ammonia have little to offer and early delivery product is quite scarce. Prices still are advancing and rule from $3.82 to $3.87, per 100 pounds, at tidewater.

Market Prices for Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.	
Pure benzol	$0.60 to .65
Toluol	2.50 to 3.00
Solvent naphtha	.25 to .30
Per Pound at Producers Plant.	
Phenol	$0.55 to .60
Per 100 Pounds at Seaboard.	
Sulphate of ammonia	$3.82 to 3.87

Contract.

Per Gallon at Producers Plant.	
Pure benzol	$0.60
Toluol	2.25 to 2.50
Solvent naphtha	.25 to .30
Per Pound at Producers Plant.	
Phenol (nominal)	$0.55 to .60
Per 100 Pounds at Seaboard.	
Sulphate of amonia (nearby)	$3.82 to 3.87

The Hershfield Piper Foundry & Machine Co., Chicago, has changed its name to the Kincaid Foundry & Machine Co., and has increased its capital stock from $75,000 to $100,000.

Iron and Money: Fact and Comment

Steel Stocks Move Sharply Upward in New Outburst of Confidence on Stock Market—Politics and Advance in Commodity Prices Are Factors

FINANCIAL interest once more has turned inward to the nearby election and the huge piling up of corporation profits. The performance of the U-53 off Nantucket has ceased to figure in stock market calculations and likewise the enigmatic peace rumors which too closely preceded that episode are almost forgotten. A short time ago, New York brokers and commission houses were warning their customers to move carefully and not to expect noteworthy activity in stocks before election. But, in defiance of all precedent and all prophecy, an outburst of confidence has swept the stock market, starting early last week.

United States Steel common moved up 10 points last week and on Monday of this week attained a new high record for all time—121¾. Following closely in its footsteps, the minor steel shares, including Republic, Lackawanna, Bethlehem, Gulf States, Crucible and others, have moved steadily upward until now they have almost regained the levels they held when the disastrous activities of the U-53 worked havoc in the market.

Some financial observers believe the stock market is discounting the election of Mr. Hughes. Entirely aside from politics, however, tremendous forces are at work in favor of values. The public, wealthy as never before, is buying steel stocks, munition shares and even rails. Phenomenal earnings by railroad and manufacturing companies are assisted by equally phenomenal monetary and credit conditions.

Even more spectacular than the stock market movement has been the wild upward rush of prices on almost all commodities, materials and manufactured products. Wheat and cotton have been blazing the way. For the first time in generations, cash wheat has sold at $2 a bushel on a legitimate supply and demand basis. Cotton is within striking distance of the 20-cent mark, a level heretofore considered an extravagant expectation. As for steel, production has been pushed to the maximum for more than a year. So far as consumers are concerned, it is not so much a question of prices as of deliveries. Coke and pig iron costs are advancing steadily and still higher steel prices are expected to prevail. New records are looked for in the earnings of steel companies the last quarter of this year and the first quarter of next.

Quotations on a number of iron, steel and industrial shares at the close of the New York stock exchange Oct. 21 and net changes for the preceding week are shown in the following table:

	Close Oct. 21.	Net chg.
American Can	61	+3½
American Can, prfd.	113⅜	+ ⅜
Amer. Car & Fdy.	68⅜	+4⅜
Amer. Car & Fdy., prfd.	119	+2
American Locomotive	82¾	+7¾
American Lococotive, prfd.	106½	—2⅜
American Steel Foundries	62¼	+4¼
Baldwin Locomotive	85½	+5⅜
Baldwin Locomotive, prfd.	108	+1
Bethlehem Steel	550	+18
Bethlehem Steel, prfd.	133	—2
Colorado Fuel & Iron	55⅝	+5⅜
Continental Can	103	—1½
Continental Can, prfd.	113	+3
Crucible Steel	87	+7⅛
Crucible Steel, prfd.	123	+6
General Electric	184¾	+8¾
Gulf States Steel	95	+3
Gulf States Steel, 2d prfd.	94½	— ½
Internat'l Harv. of N. J.	119	+3⅜
International Harv. Corp.	80	+2
Lackawanna Steel	86⅜	+2⅜
Nat'l Enamel'g & Stmp. Co.	29	+2
Nat'l En. & Stmp. Co., prf.	95	.....
Pressed Steel Car	72⅜	+ ⅜
Pressed Steel Car, prfd.	104	.....
Pullman Palace Car	170½	+ ½
Republic Iron & Steel	76⅝	+7⅜
Republic Iron & Steel, prfd.	112	.....
U. S. C. I. P. & Fdy. Co.	25¼	+2½
U. S. C. I. P. & F. Co., prf.	57½	+ ½
United States Steel	119½	+10
United States Steel, prfd.	120⅜	+ ⅜
Westinghouse Mfg. Co.	63⅜	+2⅜

Maximum quotations for a number of leading iron and steel securities not listed on the New York stock exchange as of Oct. 13 and Oct. 20 compare as follows:

	Oct. 20.	Oct. 13.
American Radiator	400½	400½
American Ship Building	58½	60
Cambria Steel	145	100
Chicago Pneumatic Tool	73	74½
LaBelle Iron Works	77½	77
Lake Superior Corp'n	14⅜	14⅜
Stewart-Warner Speed. Co.	116	116¾
Warwick Iron & Steel	9¾	9¾
Westinghouse Air Brake	159	158½
Westingh'se Elec. & Mfg. Co.	64⅛	65

Financial Crop Ends

The Thew Automatic Shovel Co., Lorain, O., advises through President F. A. Smythe its recent increase in capitalization from $750,000 to $1,000,000 was for the distribution of a 33 1/3 per cent stock dividend based on an accumulated surplus. No extensions to the works are intended at this time.

* * *

The Findlay Steel Casting Co., Findlay, O., recently incorporated with a capital stock of $200,000, of which $150,000 has been paid in, advises it will shortly erect a building of steel construction. The following equipment will be required: Crane, compression sand mill, emery grinding stand, sand blast machinery, air tools for foundry and cleaning room, scales and other foundry appliances. Open hearth and electric steel castings will be made. Officers of the company are: President and general manager, E. J. Edwards; vice president and secretary, E. T. Pelton, and treasurer, Harry A. Tilden.

* * *

Stockholders of the Solvay Coke Co. will meet at Ashland, Ky., Nov. 1, to pass on a proposal to increase the common stock from $1,300,000 to $2,500,000. The funds provided by the increase, if ratified, will be used for development at the company's coke plant and the purchase of additional coal lands.

* * *

The readjustment plan for the American Brake Shoe & Foundry Co. has been declared operative by the committee of which Gates W. McGarah is chairman. A Delaware corporation, with the same name and capitalization, has been formed. New stock will be delivered for the certificates of deposit by the Bankers' Trust Co.

* * *

Earnings of the Atlantic Steel Co., Atlanta, Ga., in September were $104,618; the surplus after charges was $84,180. Earnings for nine months ending Sept. 30 were $679,336; surplus after charges and dividends, $467,586. The September surplus was equal to 8.02 per cent on the common stock after allowing for the preferred dividend, or at the annual rate of $96.24 a share.

* * *

The trustees appointed by the referee in bankruptcy to succeed the receivers of the Exeter Machine Co., Pittston, Pa., have taken charge of the works. They are R. W. Archbald, of Scranton; L. B. Hilliard, of Wilkes Barre; and W. L. Foster, of West Pittston. The plant was operated by the receivers from their appointment on June 18. While they have made no report, it is believed a profit will be shown under their management. Application soon will be made to sell the Exeter Machine Co. at auction to the highest bidder.

* * *

Worcester, Mass., manufacturers interested in the proposed merger of the Spencer Wire Co., the Morgan Spring Co., and the Clinton Wire Cloth Co., Clinton, Mass., say negotiations are progressing with New York bankers toward the organization of a corporation to be known as the Central Wire Co., which will take over the three plants. The Wright Wire Co. probably will not be included in the merger, but other Worcester county wire products manufacturers may be included later. The new company will be a Massachusetts corporation with headquarters at Worcester, and will be capitalized at about $10,000,000. H. W. Goddard, president of the Spencer Wire Co., will head the Central Wire Co.

Would Lend Helping Hand to China

Financiers, Says Judge Gary, Willing to Provide Large Amounts of Money if They Receive Encouragement from the Government—Believes Public Sentiment Would Favor Such Action

JUDGE GARY, in an interview published by the *New York Herald* Oct. 22, said that American financiers are ready to cooperate with Japan in financing and developing China if they receive proper encouragement from the United States government. Participation by them in a Chinese loan and in the development of the great natural resources of that country is necessary if American commerce in the Orient is to be increased materially and is to have a prominent and permanent place there.

Judge Gary returned from a trip through China and Japan, impressed with the possibilities of American trade in the Far East and the need of maintaining the most cordial relations between the United States and the two great nations of the Orient.

"Japan is progressing so rapidly that it seems likely she will be the England of the Orient," he told the *Herald*. "She is a country to be reckoned with. It is fortunate for us and equally fortunate for her that the best thinking men of both countries realize that as the geographical situation has made us near neighbors the pecuniary interests and every other interest make it desirable that we should in every respect act as neighbors. We should cooperate in the effort to protect and advance our commercial lines on the Pacific ocean.

Commends Herald Editorial

"During my trip through China and Japan in August and September I came into close contact with many leading citizens of both countries, including those in governmental positions, leading bankers and business men. They represented the political, financial and commercial sentiments of their countries. I met these gentlemen at public functions and I met many of them at their homes. I had a good opportunity to ascertain their opinions concerning their own countries and the United States.

"I am satisfied that the feeling throughout China—and to the same extent throughout Japan—is sincerely friendly toward the United States.

"The leading citizens of China, from the President down, seem to appreciate the fact that they need the friendship and assistance of both the United States and Japan, and I think that they will do everything reasonable to foster business relations with these two countries.

"What China needs first of all is money—and a good deal of it. This can be and should be furnished liberally by the capitalists of the United States, who have an abundance of funds at the present time. They will be willing to provide large sums for the government of China if they receive proper encouragement from our government, and this, I think, is certain to follow, because public sentiment will sustain it."

Judge Gary strongly advocated cooperation between the United States and Japan in upbuilding China.

"In the development of China and the fair distribution of her business, which is bound to increase by leaps and bounds, the United States and Japan can and should cooperate to the fullest extent for the benefit of both countries and for the benefit of China at the same time," he said. "There is a great future in China—commercially and industrially—if advantage is taken of the opportunities offered.

Chance for Lasting Trade

"Now is a good time for the United States to secure a position in the trade of the Orient that will be permanent and of great benefit."

Speaking of Japan's place at the head of the nations of the Orient, Judge Gary expressed the belief that the time was coming when Japan would have a Monroe doctrine of her own and would live up to it.

"It is quite possible that some time in the near future Japan will adopt a Monroe doctrine of her own," he said. "However, I have not talked of this matter with any Japanese. Certainly I see no reason for objection by the United States to such a policy. Should Japan assume this position it would, of course, not apply to any rights which heretofore have been obtained or to any plans which have been consummated. It would apply with full force to the government of China, and in that case we might rely upon the doctrine of the open door in China being maintained permanently.

"Japan is just as anxious as we are to have open seas and open ports wherever she or we may be directly interested."

Judge Gary paid a tribute to the keen reasoning power of the Japanese people. "They have a good appreciation of the fact that Americans are their best business customers," he said. "They know that Americans have been of the most benefit to them in providing opportunities to learn the best methods of improving their commercial conditions. They assuredly have shown a desire to cultivate friendly relations.

Would Meet More Than Half Way

"In every offer which Americans may make to cooperate with the Japanese people in advancing the interests of both countries to the prejudice of neither, or in affording assistance in the development and improvement of China, I think that the leading and controling men in Japan will meet us more than half way.

"Of course, there are unreasonable men all over the world, and special questions are raised and must be considered from time to time. Differences have arisen and will arise, but by the exercise of prudence and discretion in a spirit of fairness and justice there need be no differences among any of these three countries which cannot be satisfactorily adjusted by friendly discussion and consideration. There is always danger that the 'jingoist' on the public platform or in the public press may stir up trouble by the misrepresentation of facts. Also there is always the possibility of serious trouble being started by the unauthorized act or language of a subordinate.

"There are at present differences between Japan and China and between Japan and the United States. These ought to be and can be amicably disposed of.

"Neither Japan nor the United States desires to have serious trouble with any other country. This being the disposition of both nations, every question—commercial, financial, industrial or political—in which they or China may be interested can be disposed of justly and satisfactorily.

The American Steel & Wire Co. has completed extensions at Donora, Pa., enabling it to use the duplexing process in its steel works. The addition comprises two 25-ton bessemer converters and a 1,300-ton metal mixer, which will work in conjunction with 11 basic open hearth furnaces.

The Waste by Fire in Foundries

The Following Article Describes the Causes of Fires in Foundries and Outlines Simple Means for the Elimination of Some of the Hazards Peculiar to This Industry

BY F. H. WENTWORTH

THE significance of the fire waste in this country is indicated by a report of the United States department of commerce and labor, which shows that the average annual per capita fire loss in six European countries is 33 cents, while the average per capita loss in the United States is $3, and in Canada $3.07. Glasgow has an annual fire loss of $325,000. Boston, smaller than Glasgow, has an annual fire loss of $2,000,000. Berlin has an average fire loss of $175,000 a year. Chicago, the same size, averages $5,000,000 annually. The Berlin fire department costs $300,000 a year; the Chicago fire department costs $3,000,000. These figures are sufficiently impressive, but they are not typical of these cities alone; they are typical of the entire United States and Canada as contrasted with Great Britain and the nations of Europe.

What is there in us, in our people, in our character, to explain this? What is the reason for this shameful contrast in the amount of property destroyed by fire? Is the explanation in a sense psychological? It is only within the last half dozen years that the United States has given any thought whatever to the conservation of its natural resources. We are now entering upon a new era, and a great deal of attention and thought is being given to this problem by men in all industries and especially by foundrymen. A special review of the fire records of foundries shows that besides the hazards common to all industries, foundries have certain special hazards peculiar to this particular industry. These are enumerated below with a brief comment on each.

Fire Hazards of Foundries

The principal hazard connected with preparing the mold is that of drying. This may be done with temporary stoves or furnaces placed directly in the mold, or with heat flues so arranged that the heat may be conducted to the interior surface of the mold, or by portable fuel oil torches or other similar means. In many cases excess moisture must be removed from the sand or else when the hot metal enters the mold it will form steam which, in expanding would endanger the mold and might even cause an explosion if there were a very large amount of moisture present. The fire record of foundries, however, does not show that this operation has been a source of any appreciable number of fires.

Core ovens are usually constructed of brick and are heated by either hard coal fires, fuel oil or gas, whichever may be most convenient. The fire record shows that 15.3 per cent of foundry fires are traceable to the core oven. Nearly all of these fires could have been prevented by exercising a few simple precautions. Although woodwork has no place in a well-designed foundry, it is nevertheless found in a great many of them. Special effort should be made to remove any woodwork which may be near these core ovens or their flues. If this cannot be done, the woodwork should be completely covered with sheet metal or, better still, wire lath and plaster and Portland cement, or some asbestos covering. A flue or oven too hot to be touched by the hand is dangerous. Where the metal stack passes through the roof it should be protected by a metal thimble with an air space or some other equivalent, so as to prevent any possible heat from the flue igniting the wooden roof. Lumber or flasks should never be placed on top of core ovens. Care should be taken that core ovens are always kept in good repair and any cracks immediately filled with cement. Where possible, it is advisable to have the core ovens outside the building, having only the door opening into the foundry.

Records show that 42.7 per cent of foundry fires reported were caused by the cupola, a large part being started by flying sparks. The remedy for such fires is a simple one: (1) All roofs within possible range of sparks from the cupola should be covered with non-inflammable material; (2) the cupola should be equipped with a hood or other device which would prevent sparks from being showered over the neighboring roofs; (3) all unprotected inflammable material should be removed from proximity to the cupola walls. Where fireproof roofs are not used they should be covered with metal with no exposed wood ventilators, frames or skylights. Special precaution should be taken to prevent the roof igniting at the point where the cupola stack passes through it. Charging floors for cupolas should be of non-combustible material, such as iron, brick or concrete. There is considerable danger of fire when the cupola is dumped, and a hand hose should always be placed nearby for such emergency. The brass furnace does not present as serious a hazard as the iron furnace. It should not, however, be in proximity to woodwork, and never be used in rooms which do not have fireproof floors. At present, brass foundries are frequently found in other than one-story buildings with the foundry floor of combustible material.

Dangers Incident to Moisture

Before molten metal is allowed to run into the ladles it is necessary to remove the moisture from the ladle. This is usually done by kindling a small wood fire in it, although in some of the more modern foundries this is accomplished by the use of a large torch and a portable fuel oil tank outfit. In either case this does not present any appreciable hazard if carefully done in a clear space in the foundry. Very frequently when the castings are poured the hot iron ignites the wooden flasks. Such fires are readily extinguished generally by throwing sand on them. Again, the hot metal may be spilled on the floor or accidentally come in contact with combustible material if there should be any in the construction of the foundry. The advisability of keeping all combustible material out of foundry buildings is obvious. If this is done there is very small probability of a fire starting from the handling of hot metal. There have been one or two instances in which fires were caused by an explosion of the mold at the time of pouring. This may be considered an unusual incident, probably due to excessive moisture. Many fires have been caused from hot smouldering flasks. As soon as the sand and castings have been re-

The author of this paper which was read at the annual meeting of the American Foundrymen's Association, Cleveland, Sept. 11 to 15, is secretary of the National Fire Protection Association.

moved from the flasks they should be placed either in an outside yard, away from buildings, or at some point where there is no possibility of their igniting buildings in case a spark lingers in them to be fanned into flame. Special precaution should be taken that wooden flasks are never put in storage in a building until several hours have elapsed since their use, to absolutely insure the presence of no live sparks. Iron flasks do not present this hazard, and the only danger of fire from them which is quite remote, is when they are placed hot against some combustible wall.

Cleaning and Finishing

The general processes of cleaning the castings are practically free from fire danger. Projections and gates are removed from castings either by hand or compressed air power chippers. An acid bath sometimes is used to clean the castings and remove any clinging sand and slag. Care should be exercised in the storage of these acids, which are usually sulphuric or hydrofluoric.

Tumbling is also a non-hazardous cleaning process accomplished by placing the castings in a slow revolving cylinder or receptacle where they become burnished by rubbing together. Coarse emery wheels are generally used to grind off projections and smooth up rough places. Emery wheel dust, if wet, may heat and ignite spontaneously. Burnishing, buffing and polishing are done with rag wheels. The principal hazards here are those due to hot bearings, spontaneous combustion, or sparks from the dust. A good collector system with metal blower pipes discharging into a fireproof receptacle is advisable. Lint should not be allowed to collect in the room and the receptacle should be frequently cleaned.

Many establishments which are primarily foundries carry on some other process in conjunction with the foundry work, and it is necessary to consider this feature in the proper study of the fire hazards of such a plant. Piping and pipe fittings are frequently dipped in asphaltum or tar to protect them from corrosion. This process should be carried on in a detached building, as fires have been caused by heating the pipes so hot that the tar was ignited when they were dipped into the bath. Painting, lacquering and japanning are other special processes which are occasionally found in connection with foundries. Their hazards will not be considered other than to advise that this work be carried on in a separate building particularly constructed for the purpose. The increasing use of fuel oil for heating core ovens and small portable torches for numerous other purposes has introduced an appreciable hazard into foundries. This material should be stored in an approved manner, and special precautions should be taken to see that all piping, tanks, etc., are maintained in good condition and free from leaks. It is advisable to have piping so arranged that in case of emergency the supply can be readily shut off at the source, and the piping drained.

It was at one time thought that automatic sprinklers were not suitable for use in foundries on account of the supposed danger of water being discharged on molten metal. Experience has shown, however, that this does not present any danger whatever and that automatic sprinklers can be used just as advantageously in foundries as in other properties. The fire record of foundries indicates that sprinklers have been very efficient when installed in such properties, and that if the system is properly laid out there is very small chance of a fire reaching serious proportions. Sprinklers are particularly effective in foundries because of the fact that a great many of the fires occur in the night after smouldering for several hours. These fires might not be discovered until they had made considerable headway. An automatic sprinkler system will promptly check any such fires and at the same time announce their discovery if an alarm system is included in the equipment.

The accompanying fire record of the foundry industry is made up from the reports received by the association since October, 1906, and includes 475 fires in foundries making all kinds of castings, such as iron, steel, brass, etc. Although there is considerable difference in these materials and in the details of making castings from them, the essential processes and hazards are very much the same, and therefore it seems quite proper to include all kinds of foundries in the same fire record. One of the most interesting things brought out in the compilation of this record is that a large number of fires in foundries are caused by hazards not usually associated with such properties; that is, some other work on a small scale is carried on in the foundry in connection with the regular business. Two examples will illustrate this: (1) five fires were caused by dipping hot iron pipes (a product of the foundry) in asphaltum or tar in order to make them less liable to rust;

Fire Record of Foundries

Common Causes.	No. of fires.	Per cent of common causes.	Per cent of known causes.
Heating	16	18.6	4.4
Lighting	12	14.0	3.3
Power	9	10.5	2.5
Lightning	4	4.6	1.1
Boiler (or fuel)	9	10.5	2.5
Oily material	5	5.8	1.4
Rubbish (or sweeping)	3	3.5	0.8
Locomotive sparks	19	22.1	5.1
Smoking	4	4.6	1.1
Miscellaneous	5	5.8	1.4
Total	86	100.0	...

Special Hazard Causes.	No. of fires.	Per cent of special hazards.	Per cent of known causes.
Cupola	112	42.7	30.7
Sparks from 87			
Heat from 14			
Miscellaneous 11			
Core oven	40	15.3	11.0
Molding, pouring and casting	34	13.0	9.3
Furnaces	25	9.5	6.9
Hot castings	8	3.0	2.2
Slag	1	0.4	0.3
Flasks	7	2.7	1.9
Fuel oil	8	3.0	2.2
Dip tank	2	0.8	0.6
Charcoal	2	0.8	0.6
Asphaltum or tar dipping of pipes	5	1.9	1.4
Phosphorus	3	1.2	0.8
Miscellaneous	15	5.7	4.1
Total	262	100.0	
Common causes	86	23.6	
Special hazard causes	262	72.0	
Incendiary	8	2.2	
Exposure	8	2.2	
Total known causes	364	100.0	
Unknown causes	111		
Total	475		

(2) in another large plant a fire started in a kitchen, which was part of the restaurant where the employes obtained their luncheon.

A study of the causes of foundry fires immediately brings out the fact that the cupola is still the most prolific cause, for 30.7 per cent of fires from known causes originated here, and nearly all these fires could have been prevented by such simple precautions as removing combustible material from the vicinity of the cupola, using only non-combustible roof coverings, and equipping the cupola with a hood or other device to prevent sparks from being showered over the neighborhood. Next to the cupola the core oven is the most frequent cause of fire. This hazard also could be almost entirely eliminated by giving careful attention to the construction of core ovens and their surroundings. Among the most frequent common causes are locomotive sparks and heating. The former is in part explained by the fact that many large plants have their own locomotives which enter various buildings, while the latter is no doubt largely due to the habit of constructing a rough office with a carelessly installed stove in the foundry proper for the use of the foreman or superintendent.

The record shows that 62.7 per cent of all foundry fires occurred at night, and for this reason they may smoulder for several hours unless a watchman is present to detect the fire. However, 32.9 per cent of all foundry fires were discovered by the watchman, which is a very good record. It is doubtful if there is any industry in which a watchman has better opportunities to prevent loss by fire than in a foundry, and consequently great care should be used to select a suitable man for this position. An examination of the record of automatic sprinklers in this class of property indicates that they have been very successful, for there were only 2.5 per cent classed as unsatisfactory and only 3.8 per cent of fires in buildings equipped with automatic sprinklers resulted in large losses.

It may be said that most of the fires in foundries can be prevented by the proper safeguarding of heating devices. Also, the use of combustible material should be avoided as far as practicable. If this is done and an automatic sprinkler system is installed, there should be very small chance of a serious fire.

The Allis-Chalmers Mfg. Co. has disposed of the remaining portion of its abandoned manufacturing plant at Washtenaw avenue and Twelfth street, Chicago, to Selph & Goldblott. The first sale was to the Simmons Co., of Kenosha. The portion just disposed of includes 82 x 530 feet, and is improved by three 1-story buildings which will be used by the new owners, who conduct a wholesale metal business.

Obituaries

Henry Splitdorf, inventor of the Splitdorf magneto and other electrical appliances, died Oct. 16 at his home in New York City, aged 83 years. He was a pioneer in the development of ignition devices.

Hon. David N. Camp, president of the Skinner Chuck Co., New Britain, Conn., former mayor of the city and fondly referred to as New Britain's "Grand old man" died at his home there, Oct. 19, of infirmities due to old age, aged 96 years. Until a few weeks ago, he was at the office of the company daily taking an active part in its affairs. He was also prominent in educational work.

Carl G. Tideman, president of the Worcester Nut Mfg. Co., Worcester, Mass., which started business last December, died at his home in that city, Oct. 19, from heart trouble, aged 59 years. Mr. Tideman was widely known as a designer and inventor, having originated many mechanical devices and machines. For many years he was special designer for the Reed & Prince Mfg. Co., Worcester, until he went into business for himself.

The strike of 30 bench molders at the Sessions Foundry Co., Bristol, Conn., ended after the plant had been closed four days, the trouble having been adjusted and the men returned to work Friday. The men were given an advance in pay but the amount was not stated. Advances are to be made in other departments of the plant also.

Fire on Oct. 14 did considerable damage to the pattern shop of the Pittsburgh & Lake Erie Railroad Co. at McKees Rocks, Pa. The fire originated in the pattern shop and spread to other departments, destroying a number of valuable patterns, 16 coaches and damaging a number of locomotives.

The Pittsburgh Cold Rolled Strip Co., Pittsburgh, has completed plans for the erection of a plant at Verona, Pa., and will install machinery for the manufacture of strip steel products. A tandem mill will be installed by the Waterbury-Farrell Foundry & Machine Co., Waterbury, Conn.

Elections at Atlantic City

Fayette R. Plumb, of Philadelphia, was elected president at the annual meeting of the American Hardware Manufacturers' Association at the annual convention at Atlantic City, closing Oct. 20. The other officers elected were: Samuel J. Latty, first vice president; A. H. Dillon, Youngstown, second vice president; Frank Gould, Cincinnati, third vice president, and Frederick D. Mitchell, New York, secretary-treasurer.

The National Implement and Vehicle Association, at its convention at Atlantic City, last week, recorded its approval of government assistance to business interests in the extension of foreign trade; to the American merchant marine and to non-political arbitration of labor disputes. Next year's meeting will be held in Atlantic City. The officers chosen, were as follows: Joseph Dian, Moline, Ill., president; E. W. McCullough, Chicago, secretary and general manager; vice presidents, C. M. Burdette, West Chester, Pa., and Frank Bateman, Grenloch, N. J.

New Bulletin.—The Walter A. Zelnicker Supply Co., St. Louis, has recently issued a new 40-page bulletin. It contains a large number of items of interest to railroads, factories and other large industries.

The plan for reorganizing the Salisbury Steel & Iron Co. has been abandoned, according to an announcement made by the bondholders' committee, of which T. J. Grayson, of New York, is chairman. Less than one-third of the company security holders subscribed to the plan.

The Osborne Steel Foundry Co. has been organized at Racine, Wis., by John G. Osborne and C. S. Holmes, the former being president. A foundry will be built and plans are outlined to have it operating about Jan. 1.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has received contracts for furnishing electrically-operating equipment in 11 thread mills of Marshall, Field & Co., Chicago, at Spray, N. C.

Fire of unknown origin, Oct. 14, damaged the plant of the California Foundry & Machine Co., California, Pa. The loss is estimated at $10,000.

The Union Electric Steel Co., Pittsburgh, recently organized, will install one 6-ton heroult electric furnace for making alloy steels.

Merchant Mills

The United Engineering & Foundry Co., Pittsburgh, is distributing an exceedingly interesting, 32-page pamphlet, illustrating and describing various types of merchant mills. Merchant mills are defined, and a brief historical sketch is offered in the opening chapters of the brochure. The development and improvement of roll and pinion housings is outlined and a number of drawings and photographs are presented to show how improvements have been accomplished. Spindles and coupling boxes also are illustrated and described. Considerable information is offered relative to the arrangement of rolls and the adaptability of the more popular types of merchant mills. The United company has compiled a number of tables showing the average production records of simple merchant mills, rolling squares, rounds, flats, and small shapes; the most efficient operating speeds and the like. A half dozen photographs showing some interesting installations are offered.

Railway Associations

The ninth annual exhibition of the National Railroad Appliances Association will be held at the Coliseum in Chicago, March 19-22, inclusive. During the same week, the eighteenth annual convention of the American Railway Engineering Association and the March meeting of the Railway Signal Association will be held at the Congress hotel. The Association of Railway Telegraph Superintendents will also be held in Chicago during the same week. C. W. Kelly, 122 South Michigan avenue, is secretary and treasurer of the association.

Stoker Exhibit

The Geo. J. Hagan Co., 401 People's Bank building, Pittsburgh, has placed on exhibit at 326 Fourth avenue, Pittsburgh, a full sized, type E stoker, such as is handled by the company in western Pennsylvania, eastern Ohio and West Virginia. The stoker will be constantly in operation and all interested are invited to inspect it.

A New Community

Arrangements have been made by the Midvale Steel & Ordnance Co. for building at Coatesville, Pa., in connection with its Worth Bros. Co. plant, a new residential community for its officers and skilled employes. It is planning to erect about 70 modern houses, ranging in cost from $3,500 to $6,000 each, and also a complete new hotel containing 105 rooms. The residences and hotels will be erected on high ground overlooking the works. The rapid increase in the population of the city of Coatesville due to the enlarged operations of the steel works there, has made the problem of housing those connected with the works an acute one.

Plant Rebuilt

The North East Foundry & Machine Co., North East, Pa., whose plant was damaged by fire last July, a few days after it was put into operation, has rebuilt its works and now is engaged in the manufacture of a diversified line of gray iron and semi-steel castings. A 54-inch Whiting cupola, built by the Whiting Foundry Equipment Co., Harvey, Ill., is housed in a steel frame building, 80 x 100 feet. The company was incorporated Oct. 3, by Dr. J. H. Finerty of Buffalo, president; E. A. Finerty, secretary; W. G. O'Malley and F. G. Pottmeyer, vice president and general manager. Mr. Pottmeyer formerly was connected with the Pittsburgh Iron & Steel Foundries as assistant general superintendent of its plant at Midland, Pa. Mr. O'Malley is works manager of the Pittsburgh Crucible Steel Co., Pittsburgh. The company is in a position to promise early deliveries.

Ore on Toledo Docks

When navigation closes in Toledo there will be more iron ore on the docks there than for some time previous to this season. There will probably be 35,000 tons on the Ohio Central docks alone, which is much more than has been stored there for years. Thus far this season, about 25,000 tons of ore have been dumped on the docks and there are still 10,000 tons more to be brought down. The steamer Percival Roberts Jr. arrived in Toledo the latter part of last week with the largest cargo of ore ever brought to this port. The tonnage was 12,020.

A very enjoyable outing was given by the New Britain Machine Co., New Britain, Conn., to its employes recently, at Cosey Beach. All expenses of the excursion, including transportation, dinner, music, prizes for athletic events, etc., were assumed by the company, which also allowed the employes a regular day's pay.

The Carnegie Steel Co., Pittsburgh, is building a new pumping station at its Edgar Thomson Works at Bessemer, Pa.

Contract for Boilers

Toledo, O., Oct. 24.—The Jos. H Skeldon Engineering Co. recently secured the contract for the installation of boilers in a large new paper plant at Bogalusa, La., being erected by the Great Southern Lumber Co. Ernest Humlong left this week to install the boilers, of which there are ten to be installed at present, with a promise of more to follow. The plant will utilize waste lumber from the saw mill of the Great Southern Lumber Co., the largest mill in the world. G. M. Wood, of Monroe, Mich., is head of the plant, which will make fibre paper and sulphate wood pulp. A new process has been evolved which enables the concern to use material which was formerly good only for fuel.

Iron Mining in New Jersey

According to statistics compiled under the direction of the state geologist, in co-operation with the United States geological survey, only five companies were engaged in iron mining in New Jersey during 1915. Of the many iron mines in the state operated at one time or another, but five were active producers during that year. These were: The Mount Hope, Allen and Richard mines in Morris county, the Peters mine in Passaic county, and the Washington mines in Warren county.

The production of ore in 1915 was 415,234 long tons, an increase of 65,099 long tons, or 19 per cent over 1914. In 1915, 391,115 long tons of ore were marketed, valued at $1,140,000, an increase of 44,295 long tons, and in value of $64,192 over the preceding year. The stock on hand at the mines at the close of the year was 178,284 long tons. All of the iron was magnetite.

Of the total iron production in the United States, about 92 per cent is mined in the Lake Superior and Birmingham districts, but although New Jersey produces only a small percentage of the total, it ranks seventh in the country. Since 1870 there have been mined in New Jersey 20,905,461 long tons of iron ore.

New Location.—The Born Steel Range Co., 2163 E. Ninth street, Cleveland, recently purchased from the Hudson-Lorain Building Co., the 99-year lease of the Chandler block, located on Huron road near Fourth street. The Born company will occupy only the lower three floors and basement, using them for city sales rooms and offices, its factory being located on the West Side.

Big Deal Looms for Tool Builders

Bethlehem Steel Co. Has Closed on a Huge Crane Contract and Expects to Place Orders for Extensive Rolling Mill Equipment—Crane Builders Are Swamped With Business

AN increased activity is in evidence this week in the eastern machine tool market, sellers reporting a better miscellaneous demand from domestic sources. An order of considerable proportions which recently has been placed is that of the Bethlehem Steel Co. for equipment for its two new billet mills at Sparrows Point, Md. This contract was given to the Morgan Construction Co., Worcester, Mass., and calls for completion of the plants in 18 months. The larger of the two mills at Sparrows Point will be equipped with 24-inch rolls, giving one unit a capacity of 100,000 tons a month, while the smaller mill will be equipped with 18-inch rolls and will have a capacity of 50,000 tons a month. Buying generally, however, is the same as that which has characterized the market for the past several weeks, the orders which have been placed call for small lots. The large inquiries which have been pending from two of the leading ordnance manufacturing companies, as yet have not been acted upon. Foreign demand remains rather quiet. Large lathes are still being purchased for shipment abroad but not in large quantities. It is understood that Italy was among the chief buyers of this sort of equipment during the past week. South American inquiries are of small volume at this time.

Crane builders report no change in the market, as high prices and the late deliveries offered continue to check actual buying. No action so far as is known has yet been taken by the General Electric Co., with regard to its inquiry for 10 cranes. The railroads are doing no buying of any consequence.

The Southard, Robertson Co. will erect a $35,000 stove plant at Peekskill, N. Y. The Nichols Copper Co. has plans completed for a $12,000 power house for its plant at Laurel Hill, L. I., N. Y. Bids will be received shortly by the Globe Thread Co. for the general contract and mechanical equipment of its proposed plant at Long Island City, L. I., N. Y. The Badenhauser Boiler Co. will build a large plant at Morristown, Pa. The Continental Can Co. is planning to erect a $75,000 factory building at Baltimore. Bids will be received shortly by the United States government for a $600,000 gun plant. The Kent Motors Co., 1704 Broadway, New York City, will erect a $500,000 plant at Belleville, N. J. The Clinchfield Mfg. Co., cotton goods, will build an additional mill at Marion, N. C., which, with equipment, is expected to cost about $610,000.

Bethlehem Places Huge Crane Orders

THE Bethlehem Steel Co. has distributed orders for $1,000,000 worth of electric cranes, including about 60 stripping, charging and overhead machines. The Morgan Engineering Co. and the Alliance Machine Co., both of Alliance, O., will furnish the bulk of this equipment. The Bethlehem company this week will place orders for a diversified line of rolling mill equipment, involving an expenditure of about $1,500,000. Crane builders are being approached by almost every manufacturer in the district for lifting equipment. The Marshall Foundry Co., Pittsburgh, is asking bids on five 20-ton cranes; the Westinghouse Electric & Mfg. Co. is negotiating for two 20-ton cranes and the Monessen Foundry & Machine Co., Monessen, Pa., is in the market for one magnet crane. The Westinghouse Machine Co., East Pittsburgh, Pa., and the National Tube Co., Pittsburgh, are buying miscellaneous types of machine tools. Dealers say demand at present is heavier than it has been at any time this year, notwithstanding the fact that some very large orders for munition-making equipment were placed several months ago.

Large Volume of Business in Chicago

BUSINESS continues excellent with Chicago machine tool dealers. A number of small machine shops are preparing to open and require an assorted list of equipment. In addition to the diversified inquiries from these small shops, manufacturers in general are in the market almost constantly for additional tools. The situation is strong and the volume of selling is excellent. Some dealers find their business is largely domestic and foreign inquiries are in much smaller volume. Delivery on standard makes of tools has not improved materially, although some orders are being placed now for January delivery while most new equipment cannot be obtained before April. Second-hand machinery is not moving well unless it is nearly new and of late design. One Chicago dealer recently closed an order for 18 large lathes, the last of a large lot which was bought several months ago. These machines are for export.

Small Orders Feature Cincinnati Market

THE sale of small lots of machine tools is the feature of the Cincinnati machine tool market. The only large lots before manufacturers at present are for prompt delivery to foreign countries, and since few plants in Cincinnati are in a position to make immediate shipments, these inquiries are not being considered. It has been noted that the English government has been a large purchaser of boring machines in the past month, having closed for the entire output for several months in advance with two Cincinnati concerns. Machine tool builders continue to add to their manufacturing facilities. The Champion Tool Works Co. will build a plant to cost $40,000, for which equipment has not been purchased, and the Acme Machine Tool Co. is also considering the erection of a plant in Oakley to cost $100,000. The sale of second-hand machinery is good.

Business Booms in Cleveland

MACHINE tool dealers were startled this week by an inquiry which appeared in the Cleveland machine tool market for approximately 1,800 manufacturing lathes. This inquiry is believed to come from one, or possibly a combination of two, manufacturing concerns in this country. Little definite information is available, but negotiations are being carried on with a Cleveland dealer for this contract which, it is stated, will run over a period of two years. One local dealer was awarded a contract for $30,000 worth

Emergency requires Speed!

Emergencies require speed and mean extraordinary strains. No matter what the condition of the roads, the driver must take advantage of the "short cuts".

Hitting the rough spots on high is dangerous business, unless the machine is built of the right materials.

Automobile and auto truck builders realize the great importance of right materials. More and more of them are specifying "AGATHON" STEELS—especially for AXLES; CRANK SHAFTS; DRIVE SHAFTS; CONNECTING RODS; TRANSMISSION GEARS, etc.

Let us tell you "Why".

AGATHON STEELS

"AGATHON" Chrome Nickel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steels
"AGATHON" Vanadium
"AGATHON" Chrome Steel
"AGATHON" High Carbon
"AGATHON" Special Analyses

The Central Steel Company

MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Building, - - - - - - - F. Walter Gulbert, District Representative
Cleveland Office: Hickox Building, - - - - - - - The Hamill-Hickox Co., District Representative
Chicago Office: Room 1511-12 Lytton Building, 14 East Jackson Blvd., - - A. Schaeffer, District Representative
Philadelphia Office: 902 Widener Building, - - - - - - - - Frank Wallace, District Representative
J. E. Dockendorff & Co., 20 Broad St., New York, N. Y., General Export Agents

of screw machines this week. Several large lots of planers and milling machines were taken the latter part of last week. The Buckeye Engine Co., Salem, O., is understood to be in the market for an 84-inch planer. Corrigan, McKinney & Co., Cleveland, have purchased a miscellaneous lot of equipment and are in the market for a few lathes, drill presses, a disc grinder and some other sundry equipment. The Climax Motor Devices, 759 Rose building, Cleveland, is inquiring for complete equipment including screw machines, automatic machines, heavy lathes and milling machines. This concern plans to manufacture flexible couplings on a large scale and it is said that complete power plant equipment may be purchased. The market has been characterized by an unusual number of inquiries for heavy machines and one dealer states that the business closed last week was considerably greater than in any preceding week of October or September. Deliveries remain about the same.

The Willard Storage Battery Co., Cleveland, which is now making extensive additions to its plant, is in the market for the following equipment: Two 400-horsepower boilers; two 500-kilowatt turbines; three 1,000-kilowatt generator sets; two 500-kilowatt generator sets; complete acid handling equipment; a number of cranes; several small hoists and a complete installation of gravity conveyors. The Willard company plans to spend about $190,000 on the improvements which are in the course of construction. All communications should be addressed to E. D. Kretch, general manager.

New Construction and Equipment

What it is **Where it is** **Who's doing it**

Activities in the Central States

ALLIANCE, O.—The city soon will receive bids on a pumping station and a clear water basin for waterworks. Chester & Fleming, Union Bank building, Pittsburgh, are the engineers in charge of the work.

CANAL WINCHESTER, O.—A new water works plant to cost $12,000 will be built. No equipment has been purchased. Bids will be taken soon.

CLEVELAND.—The council has provided $100,000 to erect a new fire station on Carnegie avenue.

CLEVELAND.—The Sawyer Gear & Mfg. Co. has been incorporated with $15,000 capital, by W. R. Sawyer, H. W. Kilpatrick and W. O. Johnson.

CLEVELAND. — The Ohio Blower Co. have applied for a permit to erect a $30,000 plant on Detroit avenue near Ninety-third street.

CLEVELAND.—Architect W. S. Ferguson, 1900 Euclid Avenue building, will award contracts this month for the new plant of the Atlas Car & Mfg. Co., which will cost about $60,000.

CLEVELAND. — The George Rider Co., Century building, will award contracts this month for the new foundry building for the Cleveland Co-operative Stove Co. The new structure will be of brick, 1-story, and will cost about $125,000.

CLEVELAND.—The commissioner of purchases and supplies will receive bids up to noon Oct. 25 for a freight elevator for the Division avenue pumping station. Specifications may be obtained by applying to the commissioner of water, 211 City Hall.

CLEVELAND.—The T. E. Henry Furnace Co. has purchased the plant of the Novelty Iron Co., Canton, O., and will be reincorporated with a capital of $150,000. The new name of the company will be the Henry-Miller Foundry Co. The company is now operating the Medina Foundry Co., with a branch plant at Chagrin Falls. The main office of the company will be at Canton, O.

COLUMBUS, O.—Plans for a new $30,000 lime manufacturing plant, to be operated in connection with the city filtration plant, have been approved by the council. Jerry O'Shaughnessy, superintendent of water works, states that a bond issue will be authorized at once.

HAMILTON, O.—The Niles Tool Works Co. will erect a brass foundry on Mill street, to cost $30,000.

NORWALK, O.—Equipment will be needed for a new ice plant to be built by the Maple City Ice Co. to cost $25,000. Plans are in progress.

PIQUA, O.—The Pennsylvania railroad has awarded to John G. Hall, Indianapolis, Ind., a contract for the construction of its new yards at Bradford, which will cost about $1,000,000.

PIQUA, O.—The Piqua Handle Mfg. Co. will erect a manufacturing plant and power house. Plans for the structure, which will be 65 x 325 feet, are being prepared by architects and engineers, Wernett, Bradfield & Mead, Housman building, Grand Rapids, Mich.

PORTSMOUTH, O.—The Portsmouth Solvay Coke Co. has been incorporated with a capital stock of $2,000,000, to build a by-product coke plant. Work is in progress and the ovens are expected to be in operation early in the fall of 1917. The incorporators are Alex Glass, J. G. Hazard, J. G. Battelle, J. C. Miller and J. H. Frantz.

VERMILLION, O.—The Dall Motor Parts Co. has been incorporated with $35,000 capital, by F. P. Penning, E. G. Connelly and S. A. Dall.

SPRINGFIELD, O. — S. E. Greenwalt states that he will erect a factory building, near Center street and Wittenberg avenue.

WESTERVILLE, O.—A 600,000-gallon steel tank to cost $30,000, will be erected as an addition to the water works plants here. Address Ray Blinn, city manager, Westerville.

ZANESVILLE, O.—Directors of public service will open bids Oct. 30 for the construction of a new water works system to include pumping station, force mains, engines, boilers, etc. J. R. Kemmer, 1116 House building, Pittsburgh, is consulting engineer.

CHARLESTON, W. VA.—The board of education plans to build a high school, to cost $150,000.

FRANKLIN, W. VA.—The Farris Bridge Co., Charleston, has been awarded a contract for constructing the Keles Mill bridge, to cost $5,900. Gordon Bogg is county clerk.

GUYANDOTTE, W. VA.—The board of education has awarded A. L. Shockey, Huntington, a contract for erecting a 12-room, fireproof grade school, to cost $45,846.

MARTINSBURG, W. VA.—The plant of the National Limestone Co., which was sold to C. L. Peaslee and W. W. Jackson, Williamsport, Pa., for $200,000, will be reopened with increased facilities.

NEW CUMBERLAND, W. VA.—The Gray Castings Co. has been incorporated with $100,000 capital to manufacture iron castings.

ST. ALBANS, W. VA.—The Roessler & Hasslacher Chemical Co., Perth Amboy, N. J., plans to build a plant, to cost about $1,000,000.

ANDERSON, IND.—A. D. Tolin, Ottumwa, Ia., has announced plans for establishing a plant here to manufacture mining tools and button attaching machines.

BRAZIL, IND.—The Wood Turret Machine Co. will build an addition for the manufacture of a new style typewriting machine.

BROWNSTOWN, IND. — The Jackson County Transmission Co. has been incorporated with $15,000 capital to supply power to Brownstown. Among the incorporators are E. F. Reagan, F. G. White and W. Jessup.

GARY, IND.—The Huse Appliances Co. has been incorporated to manufacture fuel saving devices with $100,000 capital by Carl Schmidt, C. W. Huse and D. F. Van Lieu.

GARY, IND.—The American Car & Foundry Co., which owns a site here, will erect a plant which will employ 4,000 men. Construction of the plant will be started late this fall.

GARY, IND.—The United States Steel Corporation has started to expend $1,000,000 for 65 dwellings for officials of the American

Institute Talks with

ROLLING MILL JIM

That New York Meeting was like meat to a hungry dog. Got the habit for life.

Meet you in St. Louis.

So long—

Rolling Mill Jim.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

Say you saw it in THE IRON TRADE REVIEW

Sheet & Tin Plate Co., which is soon to go in operation, employing 4,000 men.

GARY, IND.—The Gary Foundry & Machine Co. has announced plans for building a concrete and steel addition 60 x 300 feet. The company was started six months ago with 46 employes. Several hundred men will be employed when the addition is completed.

INDIANAPOLIS, IND. — The American Metal Furniture Co. has been incorporated with $10,000 capital stock by S. C. Brooks, E. J. Bennett and J. A. Miner.

INDIANAPOLIS, IND.—The Vonnegut Machinery Co. last week purchased of Hetherington & Berner, a 2-story brick building and warehouses at 19-27 West South street. The building is 95 x 300 feet. The consideration was $40,800.

KOKOMO, IND.—The Hoosier Iron Works Co., just organized with $200,000 capital, has announced plans through J. W. Johnson, president, for the construction of a concrete plant 130 x 300 feet. The contract will be let immediately.

MARION, IND.—The Marion Stove Co. has been incorporated with $100,000 capital by F. P. Fruchey, Tom Fruchey, et al.

MISHAWAKA, IND.—Rudolph Kamm is planning to build a factory to manufacture a new type of irrigating pump.

TERRE HAUTE, IND. — The Buettner-Shelburne Machinery Co. will build and equip an addition.

WABASH, IND.—The Hardware Specialties Co. has been incorporated to manufacture hardware and harness supplies with $15,000 capital by Holmes Hunter, Nelson Hunter and Aline Mattern.

CHICAGO.—The Dictator Motor Car Co. has been incorporated with $1,000,000 capital to manufacture motor cars and tractors, by G. R. Guthrie, J. H. Comegys and E. W. Spicer.

CHICAGO.—The S. Ward Hamilton Co. is building a factory for the manufacture of steel specialties at Harvey, Ill.

CHICAGO. — The Alfred O. Blaich Co., 1954 Clybourn avenue, is to build a case hardening plant 47 x 109 feet, costing $7,000.

CHICAGO.—The Imperial Brass Co., 512 South Racine avenue, will build a 6-story addition costing $85,000.

CHICAGO.—J. F. Causfield, 1725 Walnut street, will build a 1 story foundry costing $8,700.

CHICAGO.—Davidson & Weiss, architects, 53 West Jackson boulevard, are making plans for an addition to the plant of the Elgin Motor Car Co. at Argo, Ill., to cost $75,000.

CHICAGO. — The Standard Spiral Pipe Works, 4800 South Rockwell street, is inquiring for a 350-ton hydraulic press with pump and accumulator. P. O. Thompson is superintendent.

ROCKFORD, ILL. — The city council is considering the recommendation of D. H. Maury, Chicago engineer, for the installation of an electric light plant at a cost of $425,000.

SPRINGFIELD, ILL.—The Weaver Mfg. Co., manufacturer of tools, will build a 1-story addition 96 x 100 feet.

WAUKEGAN, ILL.—A new boiler will be bought shortly for the waterworks pumping station.

WAUKEGAN, ILL. — The Manufacturers Terminal Co. has submitted a plan to the city of Waukegan for the construction of a new waterworks system, including two 6,000,000-gallon pumps.

BAY CITY, MICH.—The Roeller Foundry

Business Changes, Consolidations and Expansions

The Vulcan Iron Works, Wilkes-Barre, Pa., has purchased the old Keystone mill adjoining its property on the north.

* * *

The Standard Stamping Co., Marysville, O., will move to Huntington, W. Va., in the spring. New factory buildings will be erected at that time.

* * *

The Hershfield Piper Foundry & Machine Co., Chicago, has changed its name to the Kincaid Foundry & Machine Co. and has increased its capital from $75,000 to $100,000.

* * *

The E. H. Horton & Son Co., Windsor Locks, Conn., maker of chucks, has purchased the plant of the Windsor Locks Machine Co., to extend its business. The latter company will continue to make special machinery.

* * *

The Latrobe Electro Steel Co., Latrobe, Pa., manufacturer of electric furnace steel products, is opening an office in Cincinnati for the sale of its tool steel products. Edwin M. Ong will have charge of the office after Oct. 31.

* * *

The Connecticut Brass Co., Waterbury, Conn., has sold its Mixville, Conn., plant to J. E. Liggett, New York, for approximately $600,000. Mr. Liggett proposes to increase the capital and to add to the plant facilities.

* * *

The project for the construction of coke ovens for the Hamilton By-Products Coke Ovens Co., Sun Life building, Hamilton, Ont., has been deferred until next year.

* * *

The Cleveland office of the Cutler-Hammer Mfg. Co., Milwaukee, Wis., has been moved from its location in the Schofield building to new quarters on the twelfth floor of the Guardian building. G. S. Crane is in charge of the Cleveland division, which covers the western half of Pennsylvania, West Virginia and three-quarters of Ohio, with completely equipped offices in Cleveland and Pittsburgh. The central district is in charge of A. G. Pierce, with headquarters in both cities.

* * *

The Houghton Malleable Castings Co., Toledo, O., is installing machinery in the old Wilkes foundry building on Woodville street. I. L. Houghton, formerly with the National Malleable Casting Co., is at the head of the new company, which has temporary offices at 1151 Ohio building.

* * *

The Noble & Westbrook Mfg. Co., East Hartford, Conn., which is building an addition to its plant, has purchased the patterns and drawings of the Grundy Polishing Co., Florence, Mass., and will extend its drop forging business. The plant of the vice president, G. A. Carlson, Wethersfield, Conn., has been taken over by the local concern.

* * *

The new rolling mill at Granite City, Ill., shortly will be in operation in connection with the National Enameling Works.

* * *

The American Steel Export Co., Woolworth building, New York, has adopted as an identifying trade mark for its various steel and metal products, machines, etc., the word ASECO, which will appear in the form of a monogram. This word will be used in all the company's advertisements as well as on the products and the cases in which they are packed and will serve as a guarantee of quality.

* * *

L. Morris, doing business as L. Morris & Co., has opened an office at 926 Marquette building, 140 South Dearborn street, Chicago. He will deal in iron and steel scrap and will purchase and dismantle obsolete plants. He was formerly connected with the firm of S. Morris & Co. in the same line of business.

* * *

Holland Furnace Co., Holland, Mich., reports that it is 800 furnaces behind orders. It will erect a new foundry, 60 x 230 feet, adding 100 men to its payroll.

* * *

The security Trust Co., Detroit, as trustee for the Detroit Bath Tub & Brass Mfg. Co., bankrupt, has prepared the final dividend checks. They will at once be sent to creditors through the office of Lee E. Joslyn, referee in bankruptcy.

* * *

Bates & Edmonds Gas Engine Co., Lansing, Mich., is preparing to double its capacity by alterations and additions. The new plant will be in operation about the first of the year.

Blackwood Steels

The operation of our immense, new steel foundry is now in full swing.

Our large capacity and ideal facilities enable us to give you highest quality work and prompt delivery.

We are specializing the manufacture of

CASE HARDENING BOXES
and
LEAD AND CYANIDE POTS

which we are making of specially prepared steel.

SPECIFY BLACKWOOD

SUPERFINE STEEL CASTINGS

FOR

Automobiles, Auto Trucks and High Grade Machinery

We also make **ELECTRICAL CASTINGS** of the highest Magnetic Permeability and **CASTINGS** made of **SPECIAL ALLOYS.**

WRITE US

The Blackwood Steel Foundry Co.

SPRINGFIELD, OHIO

Say you saw it in THE IRON TRADE REVIEW

Co. will build a 1-story addition to its foundry, 50 x 150 feet. W. S. Cooley is manager.

BENTON HARBOR, MICH.—The Baker-Vawter Co., W. A. Vawter, president, states that plans are being prepared by Frank B. Chase, 122 South Michigan avenue, Chicago, for a 1 story, 60 x 200-foot factory addition to cost $46,000.

DETROIT.—The Anderson Electric Car Co. will build a plant costing $7,000.

DETROIT.—The Fisher Body Co. will build a 5-story addition 160 x 266 feet. Louis Kamper, 703 Fine Arts building, is architect.

DETROIT, MICH.—The Twin Fire Spark Plug Co. has been incorporated with $20,000 capital, by Louis H. Kirby, Kalamazoo; John M. Flannery, and E. A. Rice, Detroit.

JACKSON, MICH. — The Walcott Lathe Co. will build a plant 132 x 132 feet.

JACKSON, MICH.—The Perlman Rim Co. is building an addition 100 x 440 feet and another 80 x 380 feet, in addition to a former enlargement earlier in the season.

MANISTEE, MICH.—The Manistee Iron Works will spend $25,000 for new equipment.

MONROE, MICH.—The Swiss Mfg. Co., Chicago, manufacturer of magnetos, is to remove its works to Monroe and occupy the plant of the Elkhart Mfg. Co.

ST. JOSEPH, MICH.—The Michigan Malleable Foundry Co. is building an addition 100 x 300 feet and another 60 x 80 feet.

TRAVERSE CITY, MICH.—The Monta Mower Co. has bought a tract and will build a plant for the manufacture of mowing machines. Bert Montague is president.

APPLETON, WIS.—The Northern Boiler & Structural Iron Works will build a new plant.

FOND DU LAC, WIS.—The Organ Blowing Engineering Co., manufacturer of electrical devices, will build a factory.

MADISON, WIS.—Harry Alford, architect, has awarded the general contract on the new $30,000 plant and laboratory for the C. F. Burgess Laboratories Co. at 15-21 East Washington avenue, to Weber & Gay, local.

MADISON, WIS.—M. J. Tappins, secretary, state board of control, is taking bids until Nov. 1, 2:30 p. m., for the entire construction, excepting the heating, plumbing and electrical work, on the administration building and cottage No. 1 of the new State Industrial home for women at Taycheedah. This part of the work will cost approximately $100,000. Plans were prepared by architect, Allan D. Conover, 36 Tenney block, Madison.

MILWAUKEE, WIS.—Richard F. Downey has organized the Downey Automatic Pin Setter Co., with a capital of $25,000, to manufacture bowling alley appliances. Isidor M. Lederer and H. D. Townley are associated with Mr. Downey.

MILWAUKEE.—The Milwaukee Chair Co., 3022 Center street, is taking bids for the erection of a third story to its main shop, 60 x 160 feet. The architect is John E. Dirk. The work will cost about $12,500, without equipment.

MILWAUKEE. — Architects Schnetzky & Son, 133 Second street, are taking bids for the erection of a fireproof warehouse for E. R. Godfrey & Sons Co., commission merchant, 299 Broadway. It will be of reinforced concrete, four stories and basement, 90 x 94 feet, with foundations for two additional stories, and will cost $60,000.

MILWAUKEE. — The Ladish-Obenberger Forge Co., formerly the Obenberger Drop Forge Co., with main shops at Cudahy, has engaged Klug & Smith, consulting engineers, Mack block, to prepare plans and supervise the construction of a fireproof addition, 50 x 200 feet, one story high. It will be of steel frame, with corrugated iron walls and roof.

OSHKOSH, WIS.—The Carver Ice Cream Co. is contemplating the erection of a new plant, costing about $12,000.

WAUKESHA, WIS.—Negotiations are under way between the Waukesha Merchants' association and E. H. Orersmith, Jonesville, Wis., for the establishment here of a plant for the manufacture of motor trucks. Mr. Orersmith is now making front-drive trucks on a small scale at Jonesville, but regards Waukesha, with its large motor shops and aluminum foundries as a more ideal location.

SPRINGFIELD, MO. — The Hayward Wrench Co., St. Louis, is planning to establish a plant at Springfield.

ST. CHARLES, MO.—Bids will be received about Nov. 1 by the St. Louis & St. Charles Bridge Co. on $180,000 worth of reconstruction on a highway bridge. New steel will be required in the trusses and floors. Hedrick & Hedrick, Kansas City, Mo., are engineers.

ST. LOUIS.—The Wrought Iron Range Co. will build an addition to its machine shop.

OSKALOOSA, IA.—Plans are being prepared for steel span bridges of 18-foot, 20-foot and 32-foot length and 20-foot roadway. R. H. Tumy is county engineer.

WATERLOO, IA. — The American Mfg. Co., D. Pederson, manager, 613 Jefferson street, plans to build a 4-story factory, 70 x 140 feet.

HIBBING, MINN. — Village of Hibbing plans to build a power plant costing $200,000. D. D. Haley is city clerk. C. L. Pillsbury, 805 Metropolitan Life building, Minneapolis, is engineer.

MINNEAPOLIS. — Bids will be received until Oct. 23 by K. E. Alexander, city purchasing agent, for a 30,000,000-gallon motor driven waterworks pump.

Among New England Factories

OLD TOWN, ME.—Plans are in progress for a sawmill to be erected here, and which will be owned by James Cassidy, Bangor, Me.

CONCORD, N. H.—The New England Cable Co., Concord, N. H., has been incorporated to manufacture wire and cables with $50,000 capital stock by Josiah E. Fernald, Samuel Dunsford, Fred N. Ladd, Harry J. Brown and Donald J. Macdougall, Lowell, Mass.

MONTPELIER, VT.—The Addison Electric Power Co. has been incorporated with $500,000 capital and will erect a power station generating at first 1,700 horsepower on Leicester river. I. M. Frost is one of the incorporators.

BOSTON.—The Grant Gear Works will build a brick, 1-story, 25 x 70-foot addition on the roof of its 5-story block at 151 Pearl street.

BOSTON.—The J. & G. Mfg. Co. has been incorporated to manufacture carpenters' tools with $15,000 capital by Wallace C. Sprague, president; John McGowan, Lynn, Mass., treasurer, and George Grevillius.

BOSTON.—The Boston Vaper Heating Co. has been incorporated with $10,000 capital by Roland Litchfield, president; Jane A. Hay, Roslindale, Mass., treasurer, and John J. Conway.

BOSTON.—Plans will be ready to figure about Nov. 1 for a brick and stone, fireproof, 2-story and basement building for the Massachusetts College of Pharmacy at Brookline and Longwood avenues.

BOSTON.—The Edison Co., Boston, is to increase its capital stock for additions to its property. It has given the General Electric Co. an order for a 30,000-kilowatt, horizontal turbine and will enlarge its power plant at L street, South Boston, to accommodate four 30,000-kilowatt units.

BOSTON.—The American Sugar Refining Co. will build a brick, 2-story, 87 x 103-foot delivery building, 2-story, 87 x 156-foot delivery building, 1-story, 39 x 52-foot addition to warehouse and make alterations to its 2-story, 34 x 75-foot foundry to include a 49-foot long steel bridge, charging stations for electric tractors and a galvanized iron building at its plant on Granite street, South Boston.

FALL RIVER, MASS.—The Fall River Iron Works Co. will build wood and steel, 1-story, 75 x 204-foot and 80 x 112-foot storehouses on Water street.

GARDNER, MASS.—Work will be started soon on the erection of a 2-story woodworking plant, 44 x 96 feet, at this place. Jos. Barneau is owner and builder.

GREAT BARRINGTON, MASS.—The General Electric Co., Pittsfield, Mass., plans to operate the Stanley plant on rush orders.

HOLYOKE, MASS.—The E. H. Friedrich Co. has awarded contract for a brick, 2-story, 56 x 101-foot factory building on Race street.

HOLYOKE, MASS.—The Farr Alpaca Co. will build a factory building on Cabot and Bigelow streets.

HOLYOKE, MASS.—The George C. Gill Co. division of the American Writing Paper Co., has awarded contract for a brick, 60 x 260-foot addition to its plant.

LAWRENCE, MASS.—The property of the Merrimac Foundry & Machine Co. of this city will be sold at auction Oct. 26 by J. E. Conant & Co., Lowell, Mass. The holdings of the Merrimac company comprises about 71,000 square feet of land, together with about 264 lots of mechanical equipment, including cranes, electric power unit, traveling cranes, etc. A modern steel type standard steel and glass building, 100 x 200 feet, will be sold subject to removal.

MILLBURY, MASS.—The A. D. Windle Co. has awarded a contract for a brick, mill construction, 2-story, 36 x 98-foot addition and a terra cotta mill construction, 1-story ell for a carbonizing room at its new plant which was formerly the old electric light power station.

NEW BEDFORD, MASS.—The Neshawena Mills Co. is to build a 2-story, 100 x 200-foot addition to its plant.

NEW BEDFORD, MASS.—Plans will be ready to figure about Nov. 1 for a brick, 1-story and basement, 140 x 200-foot school building for the city to cost $150,000.

PITTSFIELD, MASS.—The American Locomotive Co., Schenectady, N. Y., is said to have purchased 50 acres of the estate of the late William Russell Allen for the site of a new plant.

QUINCY, MASS.—William J. Cornell, Boston, will build a brick and concrete, 2-story garage and store building to cost $50,000 at Adams and Hancock streets.

SALEM, MASS.—The A. J. Mulholland Co., Peabody, Mass., will build a mill construction, 5-story, 50 x 200-foot factory on Pope street.

SOMERVILLE, MASS.—Peter Forg, hard-

ware manufacturer, has awarded contract for a brick, 1-story, 38 x 78-foot machine shop at 50 Park street.

TURNERS FALLS, MASS.—The F. E. Wells & Son Co. will build a 40-foot addition to its drop forge plant for a storehouse.

WESTBORO, MASS.—The town will build a brick, 2-story, 11-room high school to cost $50,000.

WORCESTER, MASS.—Charles A. Persons, president, The Persons Mfg. Co. and the Persons-Arter Machine Co., contemplates the incorporation of the New England Cycle Works with a capital of $500,000 to manufacture bicycles in a factory which it will build.

WORCESTER, MASS.—The Thomas Smith Co., manufacturer of bolts, nuts and washers, has been incorporated to do a general machine shop business with $15,000 capital by E. M. Foye, president and treasurer; M. E. Foye, clerk, and J. M. Foye. Frank H. Howard is general manager.

EAST GREENWICH, R. I.—The Ferricup Mills 3-story building was damaged by fire to the extent of $40,000.

PROVIDENCE, R. I. — The Saylesville Finishing Co., Saylesville, will erect a 70 x 79-foot addition to its plant for finishing cloth.

SAYLESVILLE, R. I.—The Saylesville Finishing Co. will build a brick, 1-story, 70 x 79-foot addition to its plant.

ANSONIA, CONN.—The Ansonia Osborne & Cheeseman Co., manufacturer of cotton webbing, has purchased property adjoining its plant. It is proposed eventually to tear down the building occupying this newly acquired land and erect modern mill structures.

BRIDGEPORT, CONN.—The Raybestos Co. has been incorporated to deal in automobiles and accessories with $1,500,000 capital by S. Simpson, L. V. Simpson and H. G. Farwell.

BRIDGEPORT, CONN.—Bids close Oct. 20 for a brick and steel, fireproof, 2-story, 30 x 50-foot addition to the building of the American Bank & Trust Co., East Main street.

BRIDGEPORT, CONN.—The Offset Tool Co. has been organized with $5,000 capital by Daniel J. Trivers, president; Cyrus Barker, vice president and treasurer, and E. J. Buckley, secretary.

HARTFORD, CONN.—Bids are in for a brick, mill construction, 3-story, 48 x 80-foot factory for the Skat Mfg. Co., on New Park avenue.

HARTFORD, CONN.—The plant of the James Pullar Co., carriage and wagon builder, Mechanic street, was burned, with a loss of $35,000.

HARTFORD, CONN.—The Travelers Insurance Co. will extend the south wing of its home office building from 9 to 20 stories and will build an addition extending toward Prospect street, both of which will cost about $1,000,000.

NEW BRITAIN, CONN.—Plans have been completed for a 62 x 194-foot addition to the factory of the Barnes & Kobert Co., which will cost $18,000 and will be used as a forge shop.

NEW HAVEN, CONN. — The Baumann Rubber Co. has awarded contract for a brick and concrete, 3-story, 32 x 75-foot factory building to cost $20,000 on Davenport avenue.

SHELTON, CONN.—The International Silver Co. is receiving bids through its arcitects, Orr & Booth, Meridan, Conn., on a 4-story, 14 x 45-foot plant addition.

WATERBURY, CONN. — The Waterbury Rolling Mills will erect two small additions this fall. The erection of two larger buildings is planned for the spring.

WATERVILLE, CONN.—The Chase Metal Co. will start the erection shortly of a large machine shop.

WILLIAMSVILLE, CONN. — The Killingly Mfg. Co., controlled by the Goodyear Tire & Rubber Co., Akron, O., will erect a yarn mill, having a capacity of 100,000 pounds of tire yarn a week.

WINSTED, CONN.—The plant of the Fitzgerald Mfg. Co., was partially burned, with a loss of $40,000.

From the Alleghenies to the Sea

ALLEGANY, N. Y.—The St. Bonventure's College has plans in progress for a power plant and college building, to cost $125,000. The building will be 2-story, 70 x 110 feet. The architects are Mowbray & Uffinger, 56 Liberty street, New York City.

BROOKLYN.—The Premier Special Macial Machine Co. has been incorporated with $50,000 capital, to manufacture dies, gages and similar tools, by A. A. Greenhoot, L. N. Haiblum and P. Kardon.

BUFFALO. — The Webster Citizens Co., 511 Amherst street, maker of ice, will build a 2-story brick addition to cost $10,000.

BUFFALO.—The Pennsylvania railroad is receiving bids for a 1-story, 60 x 400-foot freight house to be erected at Seneca and Louisiana streets.

BUFFALO, N. Y.—The Commercial Electrolytic Co. have purchased a tract of land and expect to erect a plant shortly. The company will manufacture peroxide of hydrogen.

CORTLAND, N. Y. — An $8,000, 1-story plant addition, 36 x 96 feet, will be built by the Cortland Corundum Wheel Co. C. H. Riley is in charge.

ISLIP, N. Y.—The Sayville Textile Co. has been incorporated with $50,000 capital to make textile fabrics, absorbents, etc., by R. C. Green, I. F. Gillette and J. Ockers, Oakdale.

LAUREL HILL, L. I., N. Y.—The Nichols Copper Co. has plans completed for a $12,000, 1½-story power house, 55 x 90 feet. Edward R. Nichols, 25 Broad street, New York, is treasurer of the company.

LONG ISLAND CITY, N. Y.—The plant of the Oakes Mfg. Co., maker of dies, was damaged to the extent of $130,000 by fire. The Astoria Veneer Mills suffered a damage of $60,000.

LONG ISLAND CITY, N. Y. — Bids soon will be asked by the Globe Thread Co., 147 Spring street, New York, on the general contract and mechanical equipment of its proposed plant in this city. The factory, which will also include a power house, will be three stories high, 100 x 1,200 feet. ffl ffl

NEW BERLIN, N. Y.—The Rossville Silk Mill is taking bids on the general contract to erect a 1-story, 86 x 106-foot mill at this place.

NEW YORK.—The National Insulate Co. has been incorporated with $50,000 to manufacture insulating material, by S. S. Hamburger, I. S. Beck, P. Meyer, 105 West 120th street.

NEW YORK. — The American Silk Label Mfg. Co., 169th street and Park avenue, plans to erect a $25,000, 2-story factory addition, 60 x 152 feet. The builder is the Turner Construction Co., 11 Broadway.

NORTH TONAWANDA, N. Y.—A $50,000, 4-story plant, 60 x 165 feet, is being planned for erection here by the Herschell Spillman Co.

PEEKSKILL, N. Y.—A stove plant will be built here by the Southard, Robertson Co., Beverly S. King, 103 Park avenue, New York City, architect, is receiving bids. The structure will cost $35,000 and will be 2-story, 105 x 111 feet.

PHOENIX, N. Y.—The Sweets Paper Co. is taking sub-bids on the erection of a $13,000, 1-story mill, 60 x 90 feet.

ROCHESTER, N. Y.—The Keystone Machine Co. has been incorporated with $10,000 capital, to manufacture machinery, by R. W. Arthur, W. H. and C. R. Seymour, 72 Lorimer street.

ARLINGTON, N. J.—Frank Eichorn has purchased three properties on Elm street and will erect a 2-story reinforced concrete manufacturing building.

ATLANTIC CITY, N. J.—The Scientific Instrument Co. has been incorporated with $5,600 capital to manufacture and deal in electric devices, by Andrew Jacoby, J. H. Flett, and David Altman.

GARFIELD, N. J.—A $9,000, 3-story plant, 40 x 80-feet will be erected here by the Lingi, Buenecore & Son.

HOBOKEN, N. J. — The Commonwealth Chemical Co., 1,500 Garden street, has been incorporated with $200,000 capital, by W. E. Burns, C. Schastzer and F. N. Stockelbach, Queens county, N. Y.

JERSEY CITY, N. J.—The Davis-Bournonville Co. will make additions and alterations to its plant costing $30,000.

JERSEY CITY, N. J.—The Baltimore Electric Talking Sign Co. has been incorporated to deal in electrical signs, etc. with $150,000 capital by Charles J. Garmley, John H. Patterson, Benjamin E. Gordon, Jersey City.

NEWARK, N. J.—The Fairchild-Baldwin Co., 328-32 Washington street, has taken out permit for 2-story garage to cost $20,000.

NEWARK, N. J.—The Guaranty Auto and Repair Co. has been incorporated with $100,000 capital to manufacture and sell motors, by Salvatore Frank, James Kelly, Newark; Bernard A. Kelly, East Orange.

NEWARK, N. J.—The Kent Motors Corporation which recently was incorporated to manufacture motor cars, has purchased a 16-acre tract and has started to erect its buildings.

PASSAIC, N. J.—A $7,000, 1-story mill will be erected by the Kombe Mill Co.

PATERSON, N. J.—Construction on a $42,000, 1-story mill has been started by the Victory Silk Dyeing & Finishing Co.

PLAINFIELD, N. J.—The Spicer Mfg. Co., manufacturer of universal joints, contemplates enlarging its plant.

YARDVILLE, N. J.—The Keystone Rubber Co. has been incorporated with $25,000 capital, to manufacture soft rubber goods, by A. Hughes, R. M. J. Smith, Trenton.

CONNELLSVILLE, PA.—The Pittsburgh & Lake Erie railroad plans to build a line from Connellsville to Darnley, Pa., and from there to West Virginia coal fields. J. A. Atwood, Pittsburgh, is chief engineer.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Lower price to Jan. 1, 1917; higher to July 1, 1917.)

Bessemer valley	$24.00 to 26.00
Bessemer, Pittsburgh	24.95 to 26.95
Basic, Pittsburgh	20.95 to 21.95
Basic, eastern Pa.	20.50 to 20.75
Basic, Buffalo	20.00 to 21.00
Malleable, Pittsburgh	21.95 to 22.95
Malleable foundry, Chicago	20.00 to 20.50
Malleable foundry, Philadelphia	22.75 to 23.25
Malleable foundry, Buffalo	20.00
No. 1X foundry, Philadelphia	22.00 to 22.50
No. 2 foundry, Pittsburgh	21.95 to 22.95
No. 2 foundry, Cleveland	20.00 to 20.30
No. 2 foundry, Ironton	20.00 to 21.00
No. 2 foundry, Chicago	20.00 to 20.50
No. 2X foundry, Philadelphia	21.50 to 22.00
No. 2X foundry, N. J. tidewater	21.50 to 22.00
No. 2X foundry, Buffalo	20.00
No. 2 plain, Philadelphia	21.00 to 21.50
No. 2 plain, N. J. tidewater	21.00 to 21.50
No. 2 plain, Buffalo	20.00
No. 2 southern, Birmingham	16.00
No. 2 southern, Cincinnati	18.40 to 18.90
No. 2 southern, Chicago	20.00
No. 2 southern, Phila. delivery	20.00 to 20.75
No. 2 southern, Cleveland	20.00
No. 2 southern, New York docks	20.00 to 20.50
No. 2 southern, Boston docks	20.25 to 20.75
No. 2 south. interior, New Eng.	20.50 to 21.50
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X furnace	18.50
Virginia, No. 2X, Philadelphia	21.25
Virginia, No. 2X, Jersey City	21.50
Virginia 2X, Boston points	21.75
Gray forge, eastern Pa.	19.50 to 20.00
Gray forge, Pittsburgh	20.95
Gray forge, Birmingham	14.00
Silveries, 8 per cent, furnace	27.00 to 27.50
Silveries, 8 per cent, Chicago	29.50 to 30.50
Low phos. Standard, Phila.	40.00 to 42.00
Low phos. Lebanon, Pa., furnace	34.00 to 35.00
Low phos., Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	20.75 to 22.75
Charcoal, Buffalo	21.00 to 22.00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bes., 51½ per cent, ton.	3.70
Mesabi non-Bess., 51½ per cent, ton	3.55

Eastern Ores.
(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit	8.5c to 8.9c
Local N. Y. and N. J. ores, unit	9.0c to 9.50c
Port Henry lump, at mines, ton.	$4.00

Foreign Ores.
(Per unit Philadelphia.)

Foreign Bess., 50 to 65 per cent	nominal
For'n non-Bess., 50 to 65 per cent	nominal

COKE

(At the ovens.)

Connellsville furnace	$7.00 to 7.50
Connellsville fur., contract	3.75 to 4.00
Connellsville foundry, contract	7.00
Connellsville foundry	5.00 to 5.50
Wise county furnace, contract	3.75 to 4.25
Wise county foundry, contract	4.25 to 4.75
Pocahontas foundry, contract	4.25 to 4.75
Pocahontas furnace, contract	3.75 to 4.25
New River foundry, contract	4.50 to 5.00
New River furnace, contract	4.00 to 4.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, or delivered prompt.	$162 to 165
Ferro manganese, 80 per cent, seaboard, or delivered, contract	162 to 165
Spiegel, 20 per cent, fur. early and last half	40.00 to 45.00
Ferro-silicon, 50 per cent, Pbg.	98.00 to 100.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $32.00; 10 to 11 per cent, $32.00; 11 to 12 per cent, $34.00; 12 to 13 per cent, $35.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billets, Phila.	$50.00 to 55.00
Forging billets, Phila.	65.00 to 70.00
Forging billets, Pbgh., nominal.	65.00 to 70.00
Forging billets, Chicago	65.00
Wire rods, Pittsburgh (nom.)	55.00 to 65.00
Bessemer billets, Youngstown	45.00 to 50.00
Bessemer billets, Pittsburgh	48.00 to 50.00
Open hearth billets, Pittsburgh	48.00 to 50.00
Open hearth billets, Youngstown	45.00 to 50.00
Bess. sheet bars, Youngstown	45.00 to 50.00
Op. h'th sheet bars, Youngstown	45.00 to 50.00
Bess. sheet bars, Pittsburgh	48.00 to 50.00
Open hearth sheet bars, Pbgh.	48.00 to 50.00
Muck bars, Pittsburgh (nominal)	45.00

SKELP

Grooved steel skelp	2.60c to 2.70c
Sheared steel skelp	3.00c to 3.25c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh & Chgo.	$33.00
Stan. op-h'th rails, Pbg & Chgo.	35.00
Light rails, 8 to 10 lbs., Pbgh.	50.00
Light rails, 8 lb., Chicago	43.00
Light rails, 12 to 14 lbs., Pbgh.	49.00
Light rails, 12 lbs., Chicago	42.00
Light rails, 16 to 20 lbs., Pbgh.	48.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York, (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

Light rails, 16 to 20 lbs., Chgo.	$41.00
Light rails, 25 to 45 lbs., Pbgh.	47.00
Light rails, 25 to 45 lbs., Chgo.	40.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c to 2.50c
Angle bars, st. sections, Chgo.	2.25c to 2.75c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	3.25c to 3.50c
Track bolts, Chicago	4.00c to 4.50c
Tie plates, Chicago	50.00 to 55.00

SHAPES, PLATES AND BARS

Structural shapes, con. Pbgh.	2.70c
Structural shapes, Pbgh.	2.75c
Structural shapes, Philadelphia	2.859c to 3.009c
Structural shapes, Chgo.	2.89c to 3.50c
Structural shapes, New York	2.869c to 3.019c
Tank plates, Chgo.	3.19c to 3.60c
Tank plates, Pittsburgh (con.)	3.00c to 3.25c
Tank plates, Pbgh.	3.50c to 4.00c
Tank Plates, Pittsburgh	3.25c to 4.00c
Tank plates, Philadelphia	3.659c to 4.159c
Tank plates, New York	3.669c to 4.169c
Bars, soft steel, Chicago	2.79c to 3.50c
Bars, soft steel, Pbgh. (con.)	2.60c to 2.70c
Bars, soft steel, Pbgh.	2.75c
Bars, soft steel, New York	2.769c
Bars, soft steel, Philadelphia	2.759c
Hoops, carloads, Pittsburgh	3.00c
Bands, Pittsburgh	2.60c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chgo.	2.35c
Bar iron, Philadelphia	2.559c to 2.659c
Bar iron, Cleveland	2.55c
Bar iron, New York	2.569c to 2.669c
Bar iron, Pittsburgh	2.65c to 2.75c
Hard Bess. steel bars, Chgo.	2.50c

SHEETS

(In cents per pound.)
(Open hearth material takes 10c above prices of bessemer.)

SHEET MILL BLACK.

Gage.	Bessemer.
17 to 21	3.20
22 to 24	3.25
25 and 26	3.30
27	3.35
28	3.40
29	3.45
30	3.55

TIN MILL BLACK

Gage.	Bessemer.
15 and 16	3.20
17 to 21	3.25
22 to 24	3.30
25 to 27	3.35
28	3.40
29 and 30	3.45
30½ and 31	3.50

GALVANIZED.

Gage.	Bessemer.
10 and 11	3.50 to 4.00
12 to 14	3.60 to 4.10
15 and 16	3.75 to 4.25
17 to 21	3.90 to 4.40
22 to 24	4.05 to 4.55
25 and 26	4.20 to 4.70
27	4.35 to 4.85
28	4.50 to 5.00
29	4.70 to 5.20
30	4.90 to 5.40

BLUE ANNEALED.

Gage.	Bessemer.
3 to 12	3.25
13 and 14	3.10
15 and 16	3.15

No. 28, black, Chicago	3.69c
No. 28 galvanized, Chicago	4.69c
No. 10, blue annealed, Phila.	3.159c to 3.419c
No. 10, blue annealed, Chgo.	3.59c to 3.69c

TIN PLATE

Tin plate, 100 lb., coke base	5.75c to 6.00c
Terne plate	4.90c

IRON AND STEEL PIPE

(Prices Adopted July 24, 1916.)

Steel.

Butt weld:—	Black.	Galv.
⅛, ¼ and ⅜ in.	62	35½
½ in.	66	51½
¾ to 3 in.	69	55½
Lap weld:—		
2 in.	63	50½
2½ to 6 in.	66	53½
7 to 12 in.	63	49½
13 and 14 in.	53½	..
15 in.	51	..

Iron.

Butt weld:—	Black.	Galv.
⅛ and ¼ in.	51	24
⅜ in.	52	25
½ in.	56	38
¾ to 1½ in.	59	43
Lap weld:—		
1¼ in.	46	31
1½ in.	52	38
2 in.	53	39
2½ to 4 in.	55	42
4½ to 6 in.	55	42
7 to 12 in.	54	41

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	54
Iron, 3½ to 4½ inches, l. c. l.	44

IRON AND STEEL PRICES

Corrected up to Tuesday noon

WIRE PRODUCTS

(Adopted Oct. 19, 1916.)
(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.70
Plain wire, jobbers', Pittsburgh	2.65
Galvanized wire, jobbers', Pbgh	3.35
Polished staples, Pbgh	2.85
Galvanized staples, Pbgh	3.55
Barb wire, painted, jobbers', Pbgh.	2.85
Barb wire, galv., jobbers', Pbgh	3.55

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled thread, 50 and 5, cut threads, 40, 10 and 2½, larger or longer, 35 and 2½.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter rolled 50, and 10; cut, 50; larger or longer, 40 and 5.

Cold pressed, semi-finished hexagon nuts, 60 and 5.

Gimlet and cone point lag bolts, 50 and 10. Hot pressed square, blank or tapped nuts, $2.70 off list; hot pressed hexagon blank or tapped, $2.70.

Cold pressed square, blank or tapped, $2.40 off; hexagon, blank or tapped, all sizes, $2.80.

RIVETS

Structural rivets, Pbgh	4.00c
Structural rivets, Chgo. delivery	4.25c
Boiler rivets, Pbgh	4.10c
Boiler rivets, Chgo. delivery	4.35c

Tinner's rivets, 45, 10 and 5 off, Pittsburgh.

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	2.60c to 2.70c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	5.00c to 5.50c

COLD ROLLED STRIP STEEL

Base price 6.00c to 6.50c per 100 pounds, hard, coils 1½ inches and wider and by .100 inch and heavier.

CAST IRON WATER PIPE

Four-inch, Chicago	$34.50 to 35.00
Six-inch and larger, Chicago	31.50 to 32.00
Six-inch Class B, New York	31.50
Four-inch Class B, New York	34.50
Four and six-inch Birmingham	29.00
Six-inch and larger, Birmingham	26.00

Leight weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.25c
Steel squares, 2-in. & ov., Cleve.	3.90c
Steel rounds, 2-in. & ov., Cleve.	3.90c
Steel bars, under 2 in., Cleveland	3.40c
Steel bars, Detroit	3.25c
Steel bars, Philadelphia	3.25c
Steel bars, New York	3.35c
Steel bars, St. Louis	3.30c
Steel bars, Cincinnati	3.35c to 3.90c
Steel bars, St. Paul	3.38c
Steel bars, over 2-in., Buffalo	4.20c
Steel bars, Buffalo	3.35c
Iron bars, Chicago	3.10c
Iron bars, Cleveland	3.35c
Iron bars, Detroit	3.20c to 3.25c
Iron bars, St. Louis	3.20c to 3.25c
Iron bars, Cincinnati	3.35c to 3.90c
Iron bars, Philadelphia	3.25c
Iron bars, New York	3.35c
Shapes, Chicago	3.25c
Shapes, Detroit	3.25c
Shapes, St. Louis	3.30c
Shapes, St. Paul	3.35c
Shapes, New York	3.35c
Shapes, Cleveland	3.40c
Shapes, Philadelphia	3.25c
Shapes, Buffalo	3.35c
Shapes and plates, Cincinnati	3.35c to 3.75c
Plates, Chicago	3.75c
Plates, Detroit	3.75c to 4.00c
Plates, St. Louis	3.80c
Plates, St. Paul	3.85c
Plates, New York	4.00c to 4.50c
Plates, Cleveland	3.80c
Plates, Philadelphia	4.00c to 4.50c
No. 10 blue anl. sheets, Chicago	3.50c
No. 10 blue anl. sheets, Cleve.	3.70c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	3.55c
No. 10 blue anl. sheets, Cinci.	3.50c
No. 10 blue anl. sheets, St. Paul	3.60c
No. 10 blue anl. sheets, Detroit	3.55c
No. 28 black sheets, Chicago	3.55c
No. 28 black sheets, Cleveland	3.50c
No. 28 black sheets, Cincinnati	3.40c
No. 28 black sheets, Detroit	3.40c to 3.50c
No. 28 black sheets, St. Louis	3.65c to 3.70c
No. 28 black sheets, St. Paul	3.65c
No. 28 galv. sheets, Chicago	4.65c to 4.75c
No. 28 galv. sheets, Cleveland	4.80c
No. 28 galv. sheets, Cincinnati	4.50c to 5.00c
No. 28 galv. sheets, Detroit	5.00c
No. 28 galv. sheets, St. Louis	5.05c to 5.15c
Hoops, Cleveland	4.00c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$21.25 to 21.75
Angle bars, steel, St. Louis	16.00 to 16.25
Arch bars and transoms, Chgo.	23.50 to 24.00
Arch bars and transoms, St. L.	23.50 to 24.00
Boiler plate, cut, No. 1, Chgo.	10.50 to 11.00
Boiler plate, cut, No. 1, St. L.	11.50 to 12.00
Boiler punchings, Chicago	13.50 to 14.00
Bundled sheet, Cincinnati	8.50 to 9.00
Busheling, No. 1, Chicago	14.75 to 15.25
Busheling, No. 1, Cincinnati	11.75 to 12.25
Busheling, No. 1, Cleveland	14.00 to 14.25
Busheling, No. 1, St. Louis	14.50 to 15.00
Busheling, No. 2, Chicago	10.00 to 10.50
Cast borings, Chicago	7.25 to 7.75
Cast borings, Cincinnati	4.75 to 5.25
Cast borings, Cleveland	6.50 to 6.75
Cast borings, St. Louis	6.25 to 6.50
Cast, No. 1, Chicago	13.00 to 13.50
Cast, No. 1, Cincinnati	12.25 to 12.75
Cast, No. 1, Cleveland	14.00 to 14.25
Cast, No. 1, St. Louis	13.25 to 13.50

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—	
New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	17.25 to 17.75
Iron axles, St. Louis	33.50 to 34.00
Iron axles, Cleve	35.00 to 36.00
Knuckles, coup., Chicago	16.75 to 17.25
Knuckles, coup., St. Louis	17.50 to 18.00
Locomotive tires, Chicago	24.00 to 24.50
Locomotive tires, St. Louis	23.50 to 24.00
Machine shop turnings, Chgo.	6.00 to 6.50
Machine shop turnings, Cleve.	5.50
Machine shop turn'gs, Cincinnati	5.25 to 5.75
Machine shop turnings, St. L.	6.00 to 6.25
Malleable agricultural, Chgo.	11.00 to 11.50
Malleable agricultural, St. Louis	12.50 to 13.00
Malleable, Cincinnati	9.00 to 9.50
Malleable railroad, Chicago	13.00 to 13.50
Malleable railroad, St. Louis	13.00 to 13.50
Pipes and flues, Cleveland	12.50 to 13.00
Pipes and flues, Chgo.	13.00 to 13.50
Pipes and flues, St. Louis	13.25 to 13.75
Railroad wrought, No. 1, Chgo.	18.00 to 18.50
Railroad wrought, No. 1, Cleve.	17.75 to 18.25
Railroad wrought, No. 1, St. L.	18.25 to 18.75
Railroad wrought, No. 1, Cinci.	14.25 to 14.75
Railroad wrought, No. 2, Chgo.	17.25 to 17.75
Railroad wrought, No. 2, St. L.	17.25 to 17.50
Shafting, St. Louis	22.50 to 23.00
Springs, Chicago	16.75 to 17.25
Steel car axles, St. Louis	37.00 to 38.00
Steel car axles, Chicago	34.00 to 35.00
Stove plate, Chicago	10.00 to 10.50
Stove plate, Cleveland	11.00 to 11.50
Stove plate, Buffalo	11.50 to 12.00
Stove plate, Cincinnati	8.50 to 9.00
Stove plates, St. Louis	11.50 to 12.00

(Gross tons.)

Axle turnings, Cleveland	$11.25 to 11.50
Busheling, No. 1, Buffalo	14.00 to 14.50
Busheling, No. 1, Pittsburgh	14.00 to 14.50
Busheling, No. 2, Buffalo	11.50 to 12.00
Bundled sheets, Pittsburgh	12.00 to 12.50
Bundled sheets, Cleveland	11.25 to 11.50
Bundled sheets, Buffalo	11.50 to 12.00
Car wheels, (iron), Pittsburgh	15.50 to 16.00
Car wheels (steel), Pittsburgh	19.00 to 19.50
Car wheels, Chicago	12.75 to 13.25
Car wheels, eastern Pa.	15.50 to 16.00
Car wheels, Buffalo	15.50 to 16.00
Car wheels, New York	13.50 to 13.75
Car wheels, St. Louis	12.75 to 13.00
Car wheels, Birmingham	10.50 to 11.00
Tram car wheels, B'ham	9.50 to 10.00
Cast borings, New York	7.50 to 7.75
Cast borings, eastern Pa.	10.50 to 11.00
Cast borings, Buffalo	8.00 to 8.25
Cast borings, Pittsburgh	9.00 to 9.25
Cast, No. 1, eastern Pa.	16.50 to 17.00
Cast, No. 1, Pittsburgh	15.50 to 16.00
Cast, No. 1, Birmingham	11.00 to 11.50
Cast, heavy No. 1, N. J. points	16.00 to 16.50
Forge, No. 1, eastern Pa.	12.00 to 12.50
Frogs, switches, guards, St. L.	18.00 to 18.50
Grate bars, Buffalo	11.50 to 12.00
Grate bars, N. J. points	12.00 to 12.25
Heavy axle turnings, Buffalo	12.00
Heavy melting steel, Pittsburgh	18.50 to 19.00
Heavy melting steel, Buffalo	18.00 to 18.50
Heavy melting steel, Chicago	17.00 to 17.50
Heavy melting steel, Cleveland	17.50 to 18.00
Heavy melting steel, Cincinnati	15.00 to 15.50
Heavy melting steel, eastern Pa.	16.00 to 16.50
Heavy melting steel, New York	15.00 to 15.50
Heavy melting steel, St. L.	18.50 to 19.00
Heavy melting steel, B'ham	11.00 to 11.50
Iron rails, Chicago	21.50 to 22.00
Iron rails, Buffalo	18.00 to 18.50
Iron rails, Cincinnati	18.00 to 18.50
Iron rails, St. Louis	20.50 to 21.00
Iron rails, Cleveland	21.00
Iron axles, Pittsburgh	35.00 to 36.00
Iron axles, Cincinnati	23.50 to 24.00
Iron axles, eastern Pa.	30.00 to 32.00
Iron axles, Chicago	35.00 to 36.00
Iron axles, Buffalo	32.00 to 33.00
Low phos. steel, Buffalo	21.50 to 22.00
Low phos. steel, Pittsburgh	22.00 to 23.00
Low phos. steel, eastern Pa.	22.50 to 23.50
Machine shop turnings, Buffalo	7.00 to 7.50
Mch. shop turnings, New York	6.75 to 7.25
Mch. shop turnings, Pittsburgh	7.50 to 8.00
Mch. shop turnings, eastern Pa.	8.50 to 9.50
Mch. shop turnings, Birmingham	6.50 to 7.00
Malleable railroad, Cleveland	16.25 to 16.75
Malleable railroad, Buffalo	15.50 to 16.00
Malleable railroad, Pittsburgh	15.75 to 16.00
Malleable railroad, eastern Pa.	13.00 to 14.00
R. R. and mch. cast, No. 1 Bfl.	16.50 to 17.00
R. R. wrought, No. 1, Buffalo	18.00 to 19.50
R. R. wrgt., No. 1, eastern Pa.	22.50 to 23.00
City wrought, New York	15.00 to 15.50
R. R. wrought, No. 1, Pbgh.	19.50 to 20.00
R. R. wrought, No. 1, B'ham	12.00 to 12.50
Reroll. rails, 5 ft. and ov., Pbgh.	20.00 to 21.00
Reroll. rails, 5 ft. & ov., Chgo.	20.00 to 20.50
Reroll. rails, 5 ft. & ov., E. Pa.	20.00 to 21.00
Reroll. rails, 5 ft. & ov., St. L.	21.00 to 21.50
Shafting, New York	19.00 to 19.50
Shafting, eastern Pa.	21.00 to 22.00
Shoveling steel, Chicago	16.00 to 16.50
Shoveling steel, St. Louis	17.00 to 17.50
Steel rails, short, Chicago	19.00 to 19.50
Steel rails, short, Cleveland	19.00
Steel rails, over 6 ft. Cleveland	18.00
Steel rails, old, B'ham	12.00 to 12.50
Steel rails, short, St. Louis	19.50 to 20.00
Steel car axles, Birmingham	26.00 to 27.00
Steel car axles, New York	32.00 to 33.00
Steel car axles, Buffalo	32.00 to 33.00
Steel car axles, Cleveland	38.00 to 39.00
Steel car axles, Pittsburgh	35.00 to 36.00
Steel car axles, eastern Pa.	30.00 to 32.00
Stove plate, N. J. points	12.25 to 12.75
Stove plate, Birmingham	9.00 to 9.25
Stove plate, Pittsburgh	11.75 to 12.00
Stove plate, eastern Pa.	13.50 to 14.00
Wrought pipe, New York	13.75 to 14.00
Wrought pipe, eastern Pa.	16.00 to 16.50
Wrought pipe, Buffalo	13.00 to 13.50

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶ Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

ACCUMULATORS.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Tod, Wm., Youngstown, O.
United Engrg. & Fdy. Co., Pittsburgh, Pa.
Wood, R. D., & Co., Philadelphia, Pa.

ACCUMULATORS.
(Hydraulic.)
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Southwark Fdy. & Mch. Co., Philadelphia, Pa.

ACETYLENE IN CYLINDERS.
Linde Air Products Co., New York City.
Oxweld Acetylene Co., Chicago, Ill.
Prest-O-Lite Co., The, Indianapolis, Ind.

AEROPLANE WIRE, STRAND AND CORD.
Roebling's, John A., Sons Co., Trenton, N. J.

AIR STORAGE TANKS.
Stewart-Warner Speedometer Corp., Chicago.

ALLOYS.
American Vanadium Co., Pittsburgh, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Blackwell, Geo. G., Sons & Co., Ltd., Liverpool, Eng.
Bourne-Fuller Co., The, Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United Steel Co., Canton, O.

ALUMINUM.
(Granulated.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM.
(Solder.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM.
(Vanadium.)
American Vanadium Co., Pittsburgh, Pa.

ALUMINUM ALLOYS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM INGOTS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM RODS.
(Sheet.)
United Smelt'g & Alum. Co., New Haven, Ct.

ANGLES, TEES, CHANNELS.
(See Steel, Structural.)

ANNEALING BOXES AND POTS.
Blackwood Steel Fdy. Co., The, Springfield, O.
Mesta Machine Co., Pittsburgh, Pa.
Pittsburgh Annealing Box Co., Pittsburgh, Pa.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Pittsburgh Valve Foundry & Const. Co., Pittsburgh, Pa.
Swedish Crucible Steel Co., Detroit, Mich.
United Engrg. & Foundry Co., Pittsburgh, Pa.
Zanesville Malleable Iron Co., Zanesville, O.

ANTIMONY.
Wah-Chang Mining & Smelting Co., New York City.

ANTIMONY OXIDES.
Wah-Chang Mining & Smelting Co., New York City.

ARMATURES.
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

ASH BUCKETS.
Lakewood Engrg. Co., Cleveland, O.

AXLES.
American Bridge Co., New York City.
American Steel Export Co., New York City.
Bethlehem Steel Co., So. Bethlehem, Pa.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Co., Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Otis Steel Co., Cleveland, O.

BABBITT METAL.
Keystone Bronze Co., Pittsburgh, Pa.
Lubricating Metal Co., The, New York City.
Ryerson, Jos. T., & Son, Chicago, Ill.

BAKERS, WIRE COATING.
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BALLS.
(Steel.)
Bethlehem Steel Co., The, So. Bethlehem, Pa.
New Departure Mfg. Co., Bristol, Conn.

BANDS.
(Steel.)
Carnegie Steel Co., Pittsburgh, Pa.

BARGES.
(Steel.)
American Bridge Co., New York City.

BARRELS, TUMBLING.
(Wire Nails.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BARS—ALLOY.
Central Steel Co., The, Massillon, O.

BARS.
(Concrete Reinforcing.)
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Inland Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
Upson Nut Co., Cleveland, O.

BARS.
(Iron and Steel.)
American Bridge Co., New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Company, Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago.
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Trussed Concrete Steel Co., Detroit, Mich.
United Steel Co., Canton, O.
Upson Nut Co., Cleveland, O.
Westerman & Co., Lockport, N. Y.

BEAMS, CHANNELS AND ANGLES.
American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

BEARINGS.
(Ball.)
New Departure Mfg. Co., Bristol, Conn.

BEARINGS.
(Vanadium Steel.)
American Vanadium Co., The, Pittsburgh, Pa.

BELT CEMENT AND DRESSING.
Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.
Williams, I. B., & Sons, Dover, N. H.

BELT LACING.
(Leather.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BELTING.
(Chain.)
Link-Belt Company, Chicago, Ill.

BELTING—LEATHER.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BENCHES.
(Steel.)
New Britain Mach. Co., New Britain, Conn.

BENCHES AND FRAMES.
(Drawing.)
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., The, Cuyahoga Falls, O.

BENDING AND STRAIGHTENING MACHINES.
Abramsen Engrg. Co., Pittsburgh, Pa.
Bertsch & Co., Cambridge City, Ind.
Birdsboro St'l Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Works Co., Cleveland, O.
Espen-Lucas Machine Works, Philadelphia, Pa.
Hinman, D. A., & Co., Sandwich, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., New York, N. Y.
United Engrg. & Fdy. Co., Pittsburgh, Pa.

BENZOL, RECOVERY PLANTS.
Koppers, H., Co., Pittsburgh, Pa.

BILLETS.
American Steel Export Co., New York City.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Otis Steel Co., Cleveland, O.
Republic Iron & Steel Co., Youngstown, O.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Whitaker-Glessner Co., Portsmouth Works, Portsmouth, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown.

BLAST FURNACE SKIP CARS.
Lakewood Engrg. Co., Cleveland, O.

BLAST FURNACE TUYERES.
Keystone Bronze Co., Pittsburgh, Pa.

BLAST FURNACE VOLUME METERS.
Clark, Chas. J., Chicago, Ill.

BLOOMS.
American Steel Export Co., New York City.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Hillman, J. H., & Sons, Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sh't & Tube Co., Youngstown, O.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above